



A SUMMARY OF CHANGES TO THE 2023 EDITION OF THE ASME BOILER AND PRESSURE VESSEL CODE

The 2023 Edition of ASME Boiler and Pressure Vessel Code published on July 1, 2023 becomes mandatory for compliance on January 1, 2024. Implementation before that date is optional, and is a matter of agreement between the user and Manufacturer at the time of contract execution.

This publication represents Bureau Veritas Inspection and Insurance Company's opinion of changes reflected herein will be of interest to the users of the ASME Code, making every effort to ensure accuracy and completeness. Please note that it is always the Certificate Holder's responsibility to comply with the Code, and therefore must refer to the actual Code rules that apply. The intent of this document is only to be a supplementary tool for facilitating Code use.

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**EXECUTIVE SUMMARY OF
THE 2023 EDITION CHANGES
TO THE
ASME BOILER AND PRESSURE
VESSEL CODE**



Executive Summary of Significant Revisions ASME Boiler & Pressure Vessel Code 2023 Edition

ASME Section I; Power Boilers

Paragraph	ASME Record No.	Description of Changes
PG-19, PG-19.1, PG-19.2, PG-19.3, PG-19.4, PG-19.5, Table PG-19, Table PG-20	20-60	Revised PG-19 to clarify that for the post forming heat treatment to be mandatory, both conditions (a) and (b) must be present. Reformatted PG-19 into PG-19.1 and PG-19.2 for better readability, and redesignated existing paragraphs PG-19.1 and PG-19.2 as PG-19.3 and PG-19.4 respectively. Added a new paragraph PG-19.5 clarifying that when the finishing-forming temperature is above the minimum heat-treating temperature given in Table PG-19, post forming heat treatment is not mandatory. Updated the General Notes in Table PG-19 and Table PG-20 with the newly revised PG-19 subparagraph references.
PG-71.3.1, PG-71.3	19-2892	Add new paragraph PG-71.3.1 and revised PG-71.3 to allow an exception for a changeover valve between a PRV and the boiler, incorporating Code Case 2254 <i>This is a significant revision</i>
PG-104.1, PG-112.2.5, Form P-4B	21-1380	Revised the referenced paragraphs to provide rules for documenting the hydrostatic test of Boiler External Piping provided by someone other than the boiler Manufacturer. Deleted Form P-4B after redesignating the use of Form P-4A for both welded and mechanically assembled BEP. <i>This is a significant revision</i>
PW-28.1.1.1	20-208	Adds rules to allow elevated temperature tensile testing of dissimilar metal welds at the design temperature. Tensile tests using nickel-based filler metals will fail in the lower tensile strength filler metal at room temperature even though the weld metal typically demonstrates adequate strength at operating temperature. This proposal provides alternate requirements for qualifying welding procedures using elevated tensile tests. <i>This is a significant revision that exceeds current Section IX requirements</i>
PW-28.1.3	20-1055	Added words to PW-28.1.3 permitting the simultaneous qualification of welding procedures by multiple organizations <i>This is a significant revision</i>
PW-39.2	21-890	Revised to address the use of buttering as an alternative to PWHT when one material in a dissimilar metal weld should not be subject to the heat treatment required for the other material. <i>This is a significant revision</i>
Table PW-39-2	22-9	Corrected the temperature ranges for combinations of P-No. 4 to P-Nos 5A and 5B Gr. 1 from “1250 – 1300 F (675 – 705 C)” to “1250 – 1350 F (675 – 730 C)”.
Table PW-39-8	20-1598	Added a mandatory requirement for PWHT of longitudinal attachments to address the issues of relaxation cracking in Strain Induced Precipitation Hardened Stainless Steels <i>This is a significant revision</i>



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PW-41.2.2	20-2756	Revised PW-41.2.2 for improved clarity, and added PW-28.1.4 making the joint design for single welded butt welds an essential variable for the WPS/PQR <i>This is a significant revision that exceeds Section IX requirements</i>
PW-51.4, PW-51.5 PW-52.2, A-302.11	19-266	PW-51.4: Revised to clarify the examination review report is the document of record for radiographic examinations. PW-51.5: Added a new subparagraph clarifying retention requirements for radiographic images and radiographic examination reports. PW-52.2: Revised to clarify the examination report is the document of record for ultrasonic examinations. and the retention requirements for ultrasonic examination reports. A-302.11: Revised to refer to the new PW-51.5 <i>This is a significant revision</i>
PG-5.5, PMB-5.1, PMB-5.5, PMB-5.6	20-2062	PG-5.5: Revised to add a reference to PMB-5.5 PMB-5.1: Revised to clarify that materials used in the construction of pressure parts for miniature boilers shall conform to one of the specifications in Section II, and shall be limited to those permitted by PG-6, PG-7, PG-8, and PG-9; improving consistency with PEB-5.3 PMB-5.5: Added a new subparagraph clarifying the use of austenitic stainless steel in electric miniature boilers of the immersion type. Previous PMB-5.5 redesignated as PMB-5.6. <i>This is a significant revision</i>



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ASME Section IV; Heating Boilers

Paragraph	ASME Record No.	Description of Changes
Various	16-2718	Reworded multiple references to the Manufacturer's Data Report Forms for consistent terminology, and added provisions for the use of a new Manufacturer's Master Modular Data Report Form, Form H-1, for documenting modular boilers. <i>This is a significant revision</i>
HG-502.2(d)(2)(-b), HG-502.4(b)(2)(-b)	22-1494	HG-502.2(d)(2)(-b): replace "IV" after "Section" with "II, Part D, Tables 6A, 6B, 6C or 6D". HG-502.4(b)(2)(-b): replace "IV" after "Section" with "II, Part D, Tables 6A, 6B, 6C or 6D". These changes reflect Section IV's decision to shift the allowable stress tables to Section II, Part D and remove them from Section IV. <i>This is a significant revision</i>
HG-511(c)	22-126	Deleted the pneumatic testing stored energy calculations and limitations added in the 2021 Edition. These requirements proved to be an unreasonable hardship to industry. The remaining subparagraphs (d) thru (k) are now redesignated as (c) thru (j) respectively. <i>This is a significant revision</i>
Part HG, Article 8 & Various	21-1427	Added new Article 8, Modular Boilers to Part HG and deleted several references to modular boilers throughout the code wherever they previously appeared. <i>This is a significant revision</i>
HLW-201.1	21-1007	Added subparagraph (d) reading "Laser-welded finned tubes meeting the requirements of HF-204.4 may be used in the construction of water heaters." This expands similar rules in Part HW to HLW boilers. <i>This is a significant revision</i>
HLW-413(c)	21-1497	Added HLW-413(c) providing guidance for tube attachment by Laser Beam Welding (LBW), and relabeling existing subparagraphs (c), (d), & (e) as (d), (e), & (f) respectively. This expands similar rules found in Part HW to HLW water heaters. <i>This is a significant revision</i>
HLW-505	20-401	Removed the 10 psi limitation on overpressure during hydrostatic test from HLW-505.1. Added new HLW-505.2 with provisions for maximum hydrostatic test pressure. Relabeled HLW-505.2 as HLW-505.3. <i>This is a significant revision</i>



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ASME Section V; Nondestructive Examination

Paragraph	ASME Record No.	Description of Changes
Article 1, T-120(e) & Mandatory Appendices III & IV	21-2047	Revised to reference SNT-TC-1A-2020, and deleted Mandatory Appendix III and IV. <i>This is a significant revision</i>
Article 1, T-150(a) & (b)	20-2600	Revised to require procedure demonstration performance on a specimen having a known discontinuity unless otherwise stated by the referencing Code. <i>This is a significant revision</i>
Article 4, Mandatory Appendix II, Table II-440	22-440	Revised values in the Table for "Indication Limits % Full Screen" to reflect those found in the 2013 and prior Editions because the values that were changed in the 2015 Edition were incorrect. <i>This is a significant revision.</i>
Article 4, Nonmandatory Appendix P	14-2317	Revised the title of Figure P-452.2-2 from "Top Diffraction" to "Tip Diffraction".
Article 4, Nonmandatory Appendix S	17-1862	Added Nonmandatory Appendix S to address Ultrasonic Examination of Brazed Joints. <i>This is a significant revision.</i>
Article 8, Mandatory Appendix XI	19-1983	Added new Mandatory Appendix XI, describing tangential field examination for detection and measurement of surface breaking cracks. <i>This is a significant revision.</i>
Article 12, Mandatory Appendix III	20-779, 20-780	Added a mandatory appendix describing the methodology to determine the sensitivity of the instrumentation used in an Acoustic Emission test, according to the location methodology used, zonal or planar. <i>This is a significant revision.</i>



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ASME Section VIII, Division 1; *Unfired Pressure Vessels*

Paragraph	ASME Record No.	Description of Changes
U-2(j), Nonmandatory Appendix NN	13-342	Added a new paragraph clarifying the responsibilities of the vessel Manufacturer to provide detailed construction requirements to a Part Manufacturer when specifying Parts. These details include design, testing, examination, and other pertinent information needed to ensure the Part is suitable for inclusion in the final pressure vessel. <i>This is a significant revision</i>
Figure UG-84.1, Figure UG-84.1M	21-1811	Figure UG-84.1: Added a new curve for materials having a minimum specified yield strength of 80 ksi. Figure UG-84.1M: Added a new curve for materials having a minimum specified yield strength of 550 MPa. <i>These are significant revisions</i>
UG-84(g) and (h)	21-544	This revision simplifies rules for qualifying WPSs when toughness testing is required. It eliminates the need to take subsized specimens representing each welding process when a multi-process test coupon is used. The new words explain how the results of impact testing are highly dependent on notch location relative to bead overlap in the weld metal and the amount of weld metal and base metal is included in the HAZ test specimen. <i>This is a significant revision.</i>
UG-84(h)(2)(-b)	19-539	Removed the requirement that materials used in production be in “the same heat treated condition for PQR plate” for P. No. 1 and Gr. 1&2 materials when qualifying a WPS with impact testing. <i>This is a significant revision.</i>
UG-99(h), UG-100(c)	18-278	Replaced UG-99(h) and UG-100(c) with requirements for calculating the minimum test temperature, deleting references to Figure UCS-66.2, Note (6). These revisions address situations demonstrated to be nonconservative, potentially allowing conditions for brittle fracture to exist during pressure testing. <i>This is a significant revision</i>
UG-101(m)	22-874	Revised UG-101(m)(2) to allow the use of MTR tensile strength values as an alternative method of determining the value of $S_{\mu avg}$. <i>This is a significant revision</i>
UW-20, Nonmandatory Appendix A	20-2144	Combined tube-to-tubesheet weld joint strength rules of Appendix A into UW-20, rewriting and reformatting UW-20, relocating Figures A-2 & A-3 as new Figure UW-20.2 and Figure UW-20.3. Deleted Nonmandatory Appendix A. <i>This is a significant revision.</i>
UW-28(d)	22-1615	Revised to permit simultaneous qualification of a welding procedure specification by multiple organizations under the rules of QG-106.4 of Section IX. <i>This is a significant revision</i>
UW-55, Mandatory Appendix 42	21-243	Added nondestructive requirements for diffusion welded components in UW-55 and deleted Mandatory Appendix 42 after incorporating its elements into the body of the code. <i>This is a significant revision</i>



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Figure UCS-66 & Figure UCS-66M; Note (1)(d), Note 2(b)	16-1823, 16-2100	Note (1)(d): Added SA/IS 2062 Grade E250, sub-qualities A, BR, B0, C as a Curve A material. Note 2(b): Added “normalized and tempered, or liquid quenched and tempered as permitted in the material specification, and” to clarify that all of these processes are acceptable premises for upgrading the assigned toughness curve from Curve A to Curve B. <i>This is a significant revision</i>
UCS-66(c)	22-1550	Adds a statement allowing a declaration of production to fine grain practice on the material test report or certificate of compliance on forged flanges to be sufficient evidence of that condition. <i>This is a significant revision.</i>
Figure UCS-66.2	18-278	Deleted Note (6) in its entirety, and all references to Note (6). Deleted reference to UG-99(h) & UG-100(c) in Step 6. These revisions address situations demonstrated to be nonconservative, potentially allowing conditions for brittle fracture to exist during pressure testing. <i>This is a significant revision</i>
UCS-85	20-1641	Revised UCS-85(b), (c), (d), (e), (g), (h), and (i) for improved clarity of intent. <i>This is a significant revision.</i>
UCL-27(a), UCL-27(b), UCL-27(c)	20-510	UCL-27(a): Reformatted previous UCL-27 to become UCL-27(a). UCL-27(b): Added new subparagraph, requiring the exemption temperature for the base material to control the MDMT for components with applied corrosion resistant linings. UCL-27(c): Added new subparagraph requiring the MDMT for components with corrosion resistant integral cladding to be governed by the warmer of the two impact test exemption temperatures when both the base material and cladding material contribute strength. <i>This is a significant revision</i>
Part UHX	13-163, 15-121	Realigned paragraphs and calculation steps for consistency between the heat exchanger types. Revised the shell and channel coefficients to be based on the mean diameter instead of the inside diameter consistent with PTB-7. Applied editorial revisions for consistency in the equations and calculation procedure descriptions, and revised the nomenclature consistent with these changes. Revised existing channel coefficients and channel stress calculations for integral conical channels, and added new channel coefficients for cones to the calculation procedures and nomenclature. Revised existing figures and added new figures supporting these changes. <i>This is a significant revision.</i>
Part UHX	21-1768	Deleted technical requirements from Part UHX that appear in 4.18 of Division 2, and added a table referencing specific paragraph locations. <i>This is a significant revision</i>



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Mandatory Appendix 5, 5-3(f), Figure 5-1	20-758, 22-372	5-3(f) & Figure 5-1: Revised to clarify the meaning of L_{limit} as being a length determined by $0.5 \cdot \sqrt{R_{tf}}$. 5-3(f): Revised to allow straight flanges longer than L_{limit} which do not meet UG-27, provided the general primary membrane stress P_m in the straight flange is limited to S for mechanical loads only when the design of the flexible shell element is performed by numerical analysis. Figure 5-1: Added markings referenced in 5-3(f). These revisions offer an option for design by analysis as an alternative to design by rule. <i>This is a significant revision</i>
Mandatory Appendix 10, 10-13(b)(7)	18-1027, 21-1092	Replaced the phrase “each welder who welded on the vessel” with “only those welders/welding operators who welded on the vessel or part” Added a requirement for maintaining continuity records for performance qualifications of welders and brazers for at least three years. <i>This is a significant revision</i>
Mandatory Appendix 26	21-1769	Deleted technical requirements from Mandatory Appendix 26 that appear in 4.19 of Division 2, and added a table referencing specific paragraph locations. <i>This is a significant revision</i>
Mandatory Appendix 42, 42-3(b)	21-2254	Revised the acceptance criteria to state: “Acceptance Criteria. There shall be no relevant indications on or adjacent to the weld line. Only indications with major dimensions greater than 1/16 in. (1.5 mm) shall be considered relevant.” The deletion of Mandatory Appendix 42. (under 21-463) makes this action moot. <i>This is a significant revision.</i>
Mandatory Appendix 45, 45-4, 45-5(a), 45-6	15-1795	45-4: Deleted reference to 45-5 45-5: Deleted subparagraph (a) and redesignated the remaining subparagraphs of 45-5. 45-6: Replaced existing requirements with new requirements addressing the design of plate frame heat exchangers. <i>This is a significant revision</i>
Mandatory Appendix 47, 47-1(d), 47-2, 47-2(b)(1), 47-3(a)(1), 47-3(a)(2), 47-3(b)(1), 47-3(b)(2); 47-4, 47-6(b), Table 47-5, Endnote 79	21-1770, 21-2030	47-1(d): Added to clarify that the person(s) in responsible charge may be subcontracted. 47-2: Deleted “within the Manufacturer’s organization” from the first sentence. 47-2(b)(1) and 47-3(a)(1): Deleted “accredited” and added “having an accredited program” 47-3(a)(2), (b)(1), and (b)(2): Deleted “a minimum number of years of experience” and “in the design of pressure vessels”, replacing these with the phrase “sufficient experience in the design of pressure vessels as” 47-4: Revise opening paragraph to clarify that the individuals, engaged in design activity while under the responsible charge of another individual, can be subcontracted. Added reference to 47-3; 47-6(b). Deleted “under 47-3”; Table 47-5: Revised reference “2.3.3.3(d)(2)(-f)” to “2.3.3.3(c)(2)(-f)”. Endnote 79: Revised “1778” to “10-1778” <i>This is a significant revision</i>



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Nonmandatory Appendix A	20-2144	Deleted, relocating its contents into UW-20. <i>This is a significant revision</i>
Code Case 3022	19-2904	Adopted this Code Case waiving production impact testing of Category B welds under qualifying conditions when UG-84(I)(1) requires production impact testing. <i>This is a significant revision. This is also an upcoming code revision for the 2025 Edition.</i>



Executive Summary of Significant Revisions

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ASME Section VIII, Division 2; *Alternative Rules for Unfired Pressure Vessels*

Paragraph	ASME Record No.	Description of Changes
Part 2, 2.2, 2.3.3, 2-A.2, 2-B.2	21-2598	Removed requirements for a certifying engineer to certify a UDS and MDR for vessels designed by rule, except as noted in paragraphs 2.2.1 and 2.3.3. <i>This is a significant revision</i>
Part 3, 3.3.6.6	20-510	Adds a new paragraph that establishes Low Temperature Operation rules for vessel with applied linings or cladding. <i>This is a significant revision</i>
Part 3, 3.11.2.4(a)	22-1550	Adds a statement allowing a declaration of production to fine grain practice on the material test report or certificate of compliance on forged flanges to be sufficient evidence of that condition. <i>This is a significant revision.</i>
Part 3, 3.11.8.2	21-544	This revision simplifies rules for qualifying WPSs when toughness testing is required. It eliminates the need to take subsized specimens representing each welding process when a multi-process test coupon is used. The new words explain how the results of impact testing are highly dependent on notch location relative to bead overlap in the weld metal and the amount of weld metal and base metal is included in the HAZ test specimen. <i>This is a significant revision.</i>
Part 3, 3.11.8.3(f)(2)	19-539	Removed the requirement that materials used in production be in “the same heat treated condition for PQR plate” for P. No. 1 and Gr. 1&2 materials when qualifying a WPS with impact testing. <i>This is a significant revision.</i>
Part 4, 4.2.5.7, 4.2.5.8, Table 4.2.1; Part 7, Table 7.2	08-1205	Added Category F (tube to tubesheet weld) descriptions in 4.2.5.7 and renumbered following section. Removed description for Tube-to-Tubesheet Welds in 4.2.5.8. Revised Table 4.2.1 to define Category F welds. Revised Figure 4.2.1 to show typical location of Category F welds. Revised Table 7.2 to address Category F. <i>This is a significant revision</i>
Part 4, 4.3.6.1	19-2133	Deleted the lower limit of 20 for L/t in Step 2, for Torispherical Dished Bolted Covers designed in accordance with Part 4.7. This lower limit was determined to be unnecessarily restrictive. <i>This is a significant revision</i>
Part 4, 4.20.2(d), Figure 4.20.1	22-372	Revised paragraph 4-20.2(d) to allow straight flanges longer than L_{limit} that do not meet 4.3.3, provided the general primary membrane stress P_m in the straight flange is limited to S for mechanical loads only when supporting the design of the flexible shell element by numerical analysis. This offers an alternative to the design by rule requirements when performing design by analysis. <i>This is a significant revision</i>



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Part 5, 5.4, Table 5.8	18-1296	Complete rewrite of paragraph 5.4, Protection Against Failure From Buckling making the design margin against buckling of 2.0 consistent with Part 4. Adds new Table 5.8 listing Load Cases. <i>This is a significant revision</i>
Part 5, 5.5.2.4, Table 5.10	17-2651	Fatigue analysis screening under Method B was nonconservative. Revised para. 5.5.2.4, and replaced Table 5.10. Updated C1 & C2 to include the FSRF from Table 5.11 & 5.12. Rewrote each step in terms of the fatigue damage or usage factor. Provided guidance for summing the damage for each step. Removed the need to run an analysis. <i>This is a significant revision</i>
Part 6, 6.2.2.2	22-1615	Revised UW-28(d) to permit simultaneous qualification of a welding procedure specification by multiple organizations under the rules of QG-106.4 of Section IX. <i>This is a significant revision</i>
Part 6, Table 6.9, Table 6.10, Table 6.11	20-2715	Revised PWHT Requirements column paragraph (c)(2) in Table 6.9, paragraph (b)(1) in Table 6.10, and paragraph (a)(1) in Table 6.11 to extend PWHT exemptions to wrought and forged butt weld fittings in addition to pipe and tube. <i>This is a significant revision</i>
Part 6, Table 6.10, Table 6.11	21-984	Revised PWHT Requirements column paragraph (b)(2), (3), (4) in Table 6.10 and paragraph (a)(2), (3), (4) in Table 6.11 to extend PWHT exemptions to wrought and forged butt weld fittings in addition to pipe and tube. <i>This is a significant revision</i>



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ASME Section VIII, Division 3; *Alternative Rules for High Pressure Vessels*

Paragraph	ASME Record No.	Description of Changes
KG-310, KG-310.1, KG-311.1(a), KG-311.2(d), KG-311.8(c), KG-311.9, KG-311.11 KG-311.13(d) KG-323(c) KG-323(h)	21-860, 22-1897	KG-310: Added requirements for reporting details of the installation location of all vessels when certifying multiple identical vessels under the same User Design Specification (UDS). KG-310.1: Added detailed requirements for the certification of multiple identical vessels under the same UDS. KG-311.1(a): Revised to require a unique serial number be assigned to each vessel when more than one vessel is certified KG-311.2(d): Revised to allow the Manufacturer to defer responsibility for designing vessel supports when support details are not in the UDS. KG-311.8(c): Deleted. Users no longer required to report the source of loading data. KG-311.9: Revised to allow the statement of years, cycles, or both; and allows for determination analytically during the design. KG-311.11: Added a new paragraph addressing how responsibilities and documentation differ when certifying vessels “built for stock”. Revised “Part KR” to read “Part KOP” and changed references to “KR-100” to read “KOP-102”, reflecting a reorganization of rules for overpressure protection devices in this Division. KG-311.13(d): Added a new subparagraph to address jurisdictional and design requirements for individual vessels when certifying multiple duplicate vessels under the same UDS. KG-323(c): Added a new paragraph addressing completion of the Manufacturer’s Design Report (MDR) when certifying multiple duplicate vessels under the same UDS. KG-323(h): Added a new subparagraph addresses documenting vessel support design considerations when not specified in the UDS or included in the Manufacturer’s design/construction/certification. <i>These are significant new requirements.</i>
KM-234.1(b)	20-3000	Added new subparagraph (b), adding a required reduction of the required impact test temperature given in subparagraph (a) by 108°F (60°C) for impulsively loaded vessels unless otherwise justified by the designer and described in the Users Design Specification (UDS). Redesignated previous subparagraph (b) as subparagraph (c). <i>This is a significant revision.</i>
KD-313	17-1971	Added wording to address using the “Critical Plane Approach” to determine the plane of analysis for calculating fatigue stresses when the principal stress axes change and the maximum shear stress plane is not readily identifiable. <i>This is a significant revision</i>



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KD-740	21-860	Added a new paragraph describing the Manufacturer's responsibility for reporting necessary design information for the design of vessel supports in the Manufacturer's Design Report. This rule applies even when these details are not included in the User's Design Specification, when the Manufacturer does not perform the vessel support design. <i>This is a significant revision</i>
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ASME Section IX, Qualification of Welding, Brazing and Fusing Procedures and Performance

Paragraph	ASME Record No.	Description of Changes
Various	20-441	Revised QG-101, QW-101, QW-200, QB-200 and QF-200 to allow outside organizations to prepare WPS/BPS/FPS and supporting PQR documents. Final certification by the qualifying organization is still required. <i>This is a significant revision.</i>
QG-109.2, Article VI	22-123	QG-109.2: Established definitions for the GMAAM process of additive manufacturing. Article VI: Added new Article with rules for qualifying additive manufacturing (AM) of parts using a wire-additive welding (GMAAM) process. <i>This is a VERY significant revision</i>
Part QW, Various	21-347	Incorporated Manual and Semi-Automatic LBW Welder Qualification Requirements <i>This is a significant revision.</i>
QW-195.3, QW-214.2(a), QW-216.2(a), QW-382.1(c)	19-1681, 22-926	QW-195.3: Added a new subparagraph for liquid penetrant (PT) Personnel Qualification, similar to the rules in Section I and VIII-1. QW-214.2(a): Revised "acceptance standards as" to "requirements". QW-216.2(a) & QW-382.1(c): Added a reference to QW-195.3. <i>This is a significant revision.</i>
Table QW-253, Table QW-255, Table QW-256, Table QW-257, Table QW-259	21-1567	Restored QW-409.4 and QW-410.9 as nonessential variables for SMAW, GMAW/FCAW, GTAW, PAW, and EGW with some editorial revisions restoring their previous requirement. Added new supplementary essential variables QW-409.30 and QW-410.87 addressing current type and passes per side. <i>This is a significant revision</i>
Table QW-264, QW-403.1, QW-403.35	19-2150	Table QW-264: Deleted essential variable QW-403.1 (change in base metal) and added new essential variable QW-403.35 describing the applicable requirements for base metal changes in substantially more detail, for Laser Beam Welding (LBW). <i>This is a significant revision</i>
QW-401.1	21-1611	Deleted the last sentence in the third paragraph, which implied that only heat affected zone (HAZ) impact tests were required to support additional qualifications of a WPS for toughness when the WPS was not previously qualified for toughness. This clarifies that the construction code specifies the requirements for toughness testing, not Section IX. <i>This is a significant revision</i>
QW-408.2	21-2534	Revised this variable for shielding gas addition, omission, or changes in gas composition. Introduced the concept of Oxygen Equivalent as a basis for these revisions when taken in combination with some electrode specifications. <i>This is a significant revision</i>
QW-409.26	20-2513	Revised to address methods for determining heat input when applying corrosion resistant or hard facing overlay welding, taking into consideration oscillation width and measuring the heat input in J/mm ² instead of J/mm. <i>This is a significant revision</i>



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QW-424.3, Table QW/QB-422	21-945, 22-320	QW-424.3: Added a new subparagraph providing an explanatory note for assigning P-Nos. to weld metals. Table QW/QB-422: Assigned P-Nos. to weld metals from SFA-5.9, SFA-5.18 and SFA-5.28 based on their SFA classifications. <i>This is a significant revision</i>
Table QW/QB-422, QW-421.1, Appendix J, J-100.	22-1476	QW-421.1: Added a sentence advising code users that P-number assignments listed in https://source-link but not identical to those printed in Table QW/QB-422 may be used. Table QW/QB-422: Revised the title. Added a subtitle informing code users of a searchable source link containing data used to generate the table. The source link updates in real time, and may contain material with assigned P-numbers not yet published table. Appendix J, J-100: Revised to add a reference to the source link mentioned in QW-421.1 and the subtitle of Table QW/QB-422. The searchable source data provides the ability to authoritatively search for base metals of interest in any desired order or grouping. <i>This is a VERY significant revision</i>
Table QW-466.1	21-2341	Corrected tabular value of “D” from 3/16 in. to 1-3/16 in. in the next to last row. <i>This action corrects a substantial error</i>
Form QW-483	20-1100	Added a field to indicate when the rules of QG-106.4 rules for group procedure qualification are applied. <i>This is a significant revision</i>
Form QW-484A	21-2338	Revised to include new qualification variables for welders performing manual and semiautomatic Laser Beam Welding (LBW). <i>This is a significant revision</i>
Nonmandatory Appendix L	21-294	Revised to clarify Nonmandatory Appendix L rules for simultaneous welder qualifications under Section IX and ISO 9606-1 to resolve confusion. Some updated and additional references were included in this action. <i>This is a significant revision.</i>



Executive Summary of Significant Revisions ASME Boiler & Pressure Vessel Code 2023 Edition

ASME Section X, *Fiber-Reinforced Plastic Pressure Vessels*

Paragraph	ASME Record No.	Description of Changes
Mandatory Appendix 8, 8-100.6	22-481	Revised to remove service life limitations for Class 3 vessels that are carbon fiber reinforced. The maximum service life of 20 years for Class 3 fiberglass vessels remains intact. There have been no changes to the service life for Class 1 and 2 vessels, which remains unlimited. <i>This is a significant revision</i>
Nonmandatory Appendix AJ	22-770	Updated and editorially revised all Manufacturer's Data Report forms listed for this code Section. Close attention to detail is encouraged when using the new forms. <i>This is a significant revision</i>



Executive Summary of Significant Revisions ASME Boiler & Pressure Vessel Code 2023 Edition

ASME Section XII, Rules for Construction and Continued Service of Transport Tanks

Paragraph	ASME Record No.	Description of Changes
TD-320, Nonmandatory Appendix N	09-1853	Added a new paragraph addressing rules for quick actuating closures, and a new Nonmandatory Appendix N. These rules follow the direction given in UG-35 and Appendix FF of Section VIII, Division 1. <i>This is a significant revision.</i>



Synopsis of Significant Revisions

ASME Boiler & Pressure Vessel Code 2023 Edition

ASME Section I; Power Boilers

NOTE: This Synopsis primarily addresses revisions affecting technical content. A separate Synopsis of Non-Technical Revisions addresses revisions intended to improve clarity and not affecting technical content.

Paragraph	ASME Record No.	Description of Changes
Preamble	21-1378	Added a statement excluding liquefied petroleum gas vaporizers from the scope of applicability in Section I.
Various	19-430	Multiple paragraphs with the unit "lb" revised to specify "lbm" or "lbf" as appropriate, and corrected the notation. In V-2.2 "lb/in." is changed to "psi". Added NOTES to Table PG-4-1 describing gage pressure.
PG-5.1	20-2646	Revised to reference PG-14, containing additional requirements for rivet materials.
PG-5.7	22-2280	Add a new paragraph to clarify that NPS and DN dimensions apply to other product forms using the nominal OD associated with the nominal NPS or DN designation.
PG-11.5	21-1485	Added brazing as a potentially subcontracted material joining method.
PG-19, PG-19.1, PG-19.2, PG-19.3, PG-19.4, PG-19.5, Table PG-19, Table PG-20	20-60	Revised PG-19 to clarify that for the post forming heat treatment to be mandatory, both conditions (a) and (b) must be present. Reformatted PG-19 into PG-19.1 and PG-19.2 for better readability, and redesignated existing paragraphs PG-19.1 and PG-19.2 as PG-19.3 and PG-19.4 respectively. Added a new paragraph PG-19.5 clarifying that when the finishing-forming temperature is above the minimum heat-treating temperature given in Table PG-19, post forming heat treatment is not mandatory. Updated the General Notes in Table PG-19 and Table PG-20 with the newly revised PG-19 subparagraph references.
PG-27.3 A-317.2.1	20-1968	Modify the definition for D, Di and R in PG-27.3 and in A-317.2.1. Removed "C" from outside diameter "D" in A-317.2.1 for consistency with PG-27.3. Aligned definitions for inside diameter and radius in PG-27.3 and A-317.2.1.
PG-27.4.6	20-2785	Revised the "y" factor table for improved technical accuracy
Figure PG-31(a)	22-2138	Revised "C - 0.17" to be "C = 0.17" for consistency with PG-31.4.
PG-42.2	21-525	Revised for consistency in marking requirements for components constructed in compliance with ASME product standards.
PG-53, Nonmandatory Appendix A-76	19-2254	Removed ligament example from PG-53, and added New Nonmandatory Appendix A-76 including examples and figures for clarification.
Figure PG-58.2.2, PG-58.4.3	22-177	Reformatted callouts in Figure PG-58.2.2 detail views and revised their references in PG-58.4.3
Figure PG-58.2-4, Figure PG-58.2-5	21-506	Revised alternatives shown in Figure PG-58.2-4 for consistency with other figures. Corrected BEP boundaries in Figure PG-58.2-5.



Synopsis of Significant Revisions

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PG-58.4.3	21-1404	Added words to clarify the determination of BEP and NBEP. Added words allowing the boiler feed shutoff valve to be located upstream of the required check valve when two or more boilers are fed from a common source.
Table PG-67.5	11-2105	Revised K_{SC} correction factors in Tables PG-67.5 and PG-67.5M
PG-67.5, PG-68.7, Table PG-67.5, Table PG-68.7, Appendix A-400	22-175	Redesignated and relocated Tables PG-67.5, PG-67.5M, PG-68.7, and PG-68.7M to a new Appendix A-400, and revised references to them in PG-67.5 and PG-68.7. These revisions further implement the shifting of technical requirements for overpressure protection devices from this code to Section XIII.
PG-71.3.1, PG-71.3	19-2892	Add new paragraph PG-71.3.1 and revised PG-71.3 to allow an exception for a changeover valve between a PRV and the boiler, incorporating Code Case 2254 <i>This is a significant revision</i>
PG-73.5.3(a)(3)	15-321	Added PG-73.5.3(a)(3), to provide acceptable seat tightness test methods when such testing is beyond the production test equipment capability.
PG-100	18-58	Revised PG-100, item (h) to require markings with the same unique identifier to establish a connection between the pressure relief device and its pilot when installing a pilot operated device.
PG-104.1	18-2443	Revised to clarify rules for subcontracting welding work under PG-11.5 or PW 1.2, and that any subcontracted work other than welding must have controls described in the Manufacturers written QC System.
PG-104.1, PG-112.2.5, Form P-4B	21-1380	Revised the referenced paragraphs to provide rules for documenting the hydrostatic test of Boiler External Piping provided by someone other than the boiler Manufacturer. Deleted Form P-4B after redesignating the use of Form P-4A for both welded and mechanically assembled BEP. <i>This is a significant revision.</i>
PG-105.1(g), PG-106.8.1, Mandatory Appendices III & VII, Form P-4	20-2940	Revised references to the PRT I Designator in PG-105.1(g), Fig. PG-105.1(g), PG-106.8.1, and Form P-4. Revised Mandatory Appendix III and VII to reference ASME CA-1, a conformity assessment standard.
PG-106.8.1(a)	22-1176	Added "and appropriate Designator" to parts stamping requirements.
PW-27	22-17	Added Capacitor Discharge Welding to PW-27, allowing its use for attaching bare wire thermocouples. The code references this welding process, but it was not previously included as an acceptable welding process in PW-27.



Synopsis of Significant Revisions

ASME Boiler & Pressure Vessel Code 2023 Edition

PW-28.1.1.1	20-208	Adds rules to allow elevated temperature tensile testing of dissimilar metal welds at the design temperature. Tensile tests using nickel-based filler metals will fail in the lower tensile strength filler metal at room temperature even though the weld metal typically demonstrates adequate strength at operating temperature. This proposal provides alternate requirements for qualifying welding procedures using elevated tensile tests. <i>This is a significant revision that exceeds current Section IX requirements</i>
PW-28.1.3	20-1055	Added words to PW-28.1.3 permitting the simultaneous qualification of welding procedures by multiple organizations <i>This is a significant revision</i>
PW-28.2	21-23	Revise PW-28.2 to clarify that performance qualification of a welder or welding operator on a production weld requires examination of the first three feet of the first production weld.
PW-38.6	21-2	Added words allowing elevated preheat maintenance to be applied only on the side of a dissimilar metal weld joint requiring preheat.
PW-39, PW-39.8, PW-39.9 Tables PW-39.1 thru PW-39.14	22-1490	Simplified wording in PW-39 and Tables PW-39-1 through PW-39-14. Eliminate unnecessary repetition. Moved capacitor discharge welding requirements to PW-39.8. Combine similar requirements for Inertia and Continuous Drive Friction welding to new paragraph PW-39.9.
PW-39.2	21-890	Revised to address the use of buttering as an alternative to PWHT when one material in a dissimilar metal weld should not be subject to the heat treatment required for the other material. <i>This is a significant revision</i>
Table PW-39-1, Table PW-39-2, Table PW-39-3, Table PW-39-4	21-1057	Remove "outside diameter" reference on NPS designations in Tables PW 39-1, -2, -3 and -4 and reformatted the notes for consistency between these tables.
Table PW-39-1, Table PW-39-5	21-1440	Table PW-39-1: Deleted the note regarding diameter of stays from General Note (b)(2). Table PW-39-5: Deleted the "Maximum holding temperature" column and heading.
Table PW-39-2	22-9	Corrected the temperature ranges for combinations of P-No. 4 to P-Nos 5A and 5B Gr. 1 from "1250 – 1300 F (675 – 705 C)" to "1250 – 1350 F (675 – 730 C)".
Table PW-39-5	21-1946	Restored Note (a) by adding the phrase "fins to pipe and tube materials, provided that" as previously given in 2019 Edition.
Table PW-39-8	20-1598	Added a mandatory requirement for PWHT of longitudinal attachments to address the issues of relaxation cracking in Strain Induced Precipitation Hardened Stainless Steels <i>This is a significant revision</i>



Synopsis of Significant Revisions

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PW-41.2.2	20-2756	Revised PW-41.2.2 for improved clarity, and added PW-28.1.4 making the joint design for single welded butt welds an essential variable for the WPS/PQR <i>This is a significant revision that exceeds Section IX requirements</i>
PW-51.4, PW-51.5 PW-52.2, A-302.11	19-266	PW-51.4: Revised to clarify the examination review report is the document of record for radiographic examinations. PW-51.5: Added a new subparagraph clarifying retention requirements for radiographic images and radiographic examination reports. PW-52.2: Revised to clarify the examination report is the document of record for ultrasonic examinations. and the retention requirements for ultrasonic examination reports. A-302.11: Revised to refer to the new PW-51.5 <i>This is a significant revision</i>
PFT-29.2	19-1346	Added paragraph PFT-29.2 allowing the use of fillet welded staybolts in locomotive-type boilers not falling within Part PL. This is most likely to be useful for repairs of locomotives.
Figure PHRSG-4, Sketch (c)	21-1929	Corrected the line on the desuperheater connection in sketch (c) from a solid line to a dashed line.
PL-17, PL-49	20-102	Added PL-49 to address dome throttles located inside the boiler, and revised paragraph PL-17 to reference PL-49
PG-5.5, PMB-5.1, PMB-5.5, PMB-5.6	20-2062	PG-5.5: Revised to add a reference to PMB-5.5 PMB-5.1: Revised to clarify that materials used in the construction of pressure parts for miniature boilers shall conform to one of the specifications in Section II, and shall be limited to those permitted by PG-6, PG-7, PG-8, and PG-9; improving consistency with PEB-5.3 PMB-5.5: Added a new subparagraph clarifying the use of austenitic stainless steel in electric miniature boilers of the immersion type. Previous PMB-5.5 redesignated as PMB-5.6. <i>This is a significant revision</i>
PFE-3.1	22-910	Revised previous references to refer to UG-150 thru UG-156 for Section VIII, Division 1 pressure relief valves.
PVG-12.1	21-53	Revised first sentence to allow pressure relief discharges of potentially toxic substances to a point of safe discharge.
Figure A-8	22-2251	Revised references to PW-11.4 in some figures to refer to PW-11.
A-317	21-950	Corrected references in A-317 from PG-16.2, PG-16.3, and PG-16.4 to reference PG-16.3, PG-16.4 and PG-16.5 respectively.
Form P-4	21-1403	Revised to include documentation of information for BEP
Form P-4	21-1402	Revise wording for Diameter on Form P-4 to allow using OD or NPS (DN).
Table A-354 Table A-354.1	22-1631	Corrected the Data Report Guide Reference Number for Form P-4A from 31 to 22, and the Reference Number for Form P-4B from 31 to 17.



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Table A-360	22-1751, 22-1750, 22-1747, 22-1746, 22-1745, 22-1744, 22-1742. 22-1741, 22-1740, 22-1739, 22-1736, 22-1731, 21-1285, 18-735, 18-734	Revised order of Notes to Table A-360 and their references. Updated referenced editions for: ASNT CP-189-2020 ASNT SNT-TC-1A-2020 ASME B31.1-2022 Updated referenced editions for ASME specifications: B1.20.1-2013(R2018) B16.1-2020 B16.3-2021 B16.4-2021 B16.5-2020 B16.24-2021 B16.34-2020 B16.42-2021 B16.47-2020 B18.1.2-1972(R2021) Updated referenced editions for ASTM specifications: A126-2004(R2019) B139-2012(2017) E8/E8M-22 E9-19 E125-63(R2018) E186-20 E280-21 E446-20
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Synopsis of Significant Revisions

ASME Boiler & Pressure Vessel Code 2023 Edition

ASME Section I; Power Boilers (Non-Technical Revisions)

Note: This Synopsis does not address numerous editorial revisions of a minor nature made by the publisher that do not affect technical requirements.

Paragraph	ASME Record No.	Description of Changes
Various	22-1787, 22-1710 22-1625, 18-2443	Eliminated the use of “he”, “his”, “him”, “her”, “himself” from the code, expanding gender neutrality.
PG-1	22-350	Revised and reformatted for clarity, no technical changes
PG-17	22-1481	Revised and reformatted for clarity, no technical changes
PG-67.1	22-185	Revised and reformatted for clarity, no technical changes
PG-68.1	22-1429	Revised and reformatted for clarity, no technical changes
PG-68.2	22-1430	Revised and reformatted for clarity, no technical changes
PG-75 PG-75.1	22-1482	Revised and reformatted for clarity, no technical changes. Created new subparagraph PG-75.1.
PG-76, PG-76.1, PG-76.2	22-1483	Revised and reformatted for clarity, no technical changes
PG-106.7	21-1615	Revised all instances of "Engineering Contractor" to "Engineering-Contractor" for consistency.
PW-1.2	22-1486	Revised and reformatted for clarity, no technical changes
PW-11, Table PW-11	22-994	Revised and reformatted for clarity, no technical changes
Table PW-11	21-1616	Revised General Note (g) for improved clarity.
Table PW-11	21-2631	Revised General Note (h) to correct the spelling of “electroslag”.
PW-16	22-1480	Revised and reformatted for clarity, no technical changes
PW-26	22-554	Revised and reformatted for clarity, no technical changes
PW-28	22-553	Revised and reformatted for clarity, no technical changes
PW-34	22-1487	Revised and reformatted for clarity, no technical changes
PW-35.1	22-1488	Revised and reformatted for clarity, no technical changes
Table PW-39-4	21-147	Reformatted General Note (a)(6)(d) for improved clarity.
PW-50	22-1402	Revised and reformatted for clarity, no technical changes
PW-51	22-1403	Revised and reformatted for clarity, no technical changes
PW-52	22-1404	Revised and reformatted for clarity, no technical changes
PW-53	22-1079	Revised and reformatted for clarity, no technical changes
Nonmandatory Appendix A-260	22-1405	Revised and reformatted for clarity, no technical changes
Nonmandatory Appendix A-270	22-1406	Revised and reformatted for clarity, no technical changes
Nonmandatory Appendix C		Deleted Nonmandatory Appendix C. These guidelines are now in Mandatory Appendix VIII, and referenced in PW-39.3.
Nonmandatory Appendix G	22-916	Deleted Nonmandatory Appendix G, providing guidance to new paragraph locations in Section XIII.



Synopsis of Significant Revisions

ASME Boiler & Pressure Vessel Code 2023 Edition

ASME Section II, Part C: *Welding Consumable Materials*

Specification	ASME Record No.	Description of Changes
SFA-5.10/5.10M	21-530	Adopted AWS A5.10/A5.10M:2021 "Specification for Bare Aluminum and Aluminum-Alloy Welding Electrodes and Rods" as SFA-5.10/SFA-5.10M. Significant changes include: -Addition of weld metal strength requirements. -Established a standardized test joint and standardized welding procedures. -Added a requirement to determine all-weld-metal strength and elongation for all classifications. -Established minimum tensile strength requirements for the most common alloys. The balance of alloys have no minimum UTS requirement, but requires a report of results. Minimum values are to be included when sufficient test data is available. -Added a general "-G" classification.
SFA-5.13/5.13M	21-721	Adopted AWS A5.13/5.13M:2021 "Specification for Surfacing Electrodes for Shielded Metal Arc Welding".
SFA-5.15/5.15M	21-2050	Adopted AWS A5.15/A5.15M:1990 (R2016) " Specification for Welding Electrodes and Rods for Cast Iron" as SFA-5.10/SFA-5.10M.
SFA-5.18/5.18M	21-1660	Adopted AWS A5.18/A5.18M:2021 "Specification for Carbon Steel Electrodes and Rods for Gas Shielded Arc Welding" as SFA-5.18/SFA-5.18M. Significant changes include: -Added an optional supplemental "A" designator to indicate that an ER70S-6A electrode or R70S-6A rod has met the chemical composition requirements of A-No. 1. -Added optional supplemental designators to indicate ranges of shielding gases for which an electrode meets the requirements for classification, including any optional, supplemental designators. <i>This resolves major issues previously associated with determining the A-No. for these filler metals.</i>
SFA-5.20/5.20M	21-1661	Adopted AWS A5.20/A5.20M:2021 "Specification for Carbon Steel Electrodes for Flux Cored Arc Welding" as SFA-5.20/SFA-5.20M. Significant changes include: -Removed the "Q" optional supplemental designator due to lack of use. -Removed the "D" optional supplemental designator, allowing the publication of consistent rules and updating of the AWS D1.8 specification. -Added a requirement to report Boron content. -Removed the EXXT-13 classification due to lack of use. -Added an optional supplemental designator to indicate ranges of shielding gases for which an electrode meets the requirements for classification, including any optional diffusible hydrogen ("HX") or low temperature toughness ("J") supplemental designators.



Synopsis of Significant Revisions

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SFA-5.23/5.23M	21-2038	Adopted AWS A5.23/A5.23M:2021 "Specification for Low-Alloy and High Manganese Steel Electrodes and Fluxes for Submerged Arc Welding" as SFA-5.23/SFA-5.23M. Significant changes include: -New designators for low Mn + Ni B91 weld deposit. -New classifications (EB115 and B115) for an electrode and corresponding weld deposit with 10.5% Cr and 0.5% Mo modified with niobium and vanadium. -A new classification (Mn2) for an austenitic high manganese (nominal 19% Mn) weld deposit.
SFA-5.24/5.24M	21-2048	Adopted AWS A-5.24/A-5.24M:2014 "Specification for Zirconium and Zirconium-Alloy Welding Electrodes and Rods" as SFA-5.24/5.24M.
SFA-5.25/5.25M	21-2049	Adopted AWS A-5.25/A-5.25M:97 (R2009) "Specification for Carbon and Low-Alloy Steel Electrodes and Fluxes for Electroslag Welding" as SFA-5.25/5.25M.
SFA-5.29/5.29M	21-679	Adopted AWS A5.29/A5.29M:2021 "Specification for Low-Alloy Steel Electrodes for Flux Cored Arc Welding" as SFA-5.29/SFA-5.29M. Significant changes include: -Added a note requiring a report of the boron level if above 10 ppm or if intentionally added. -Added Five new low-alloy types (B92, K10, K11, K12 and K13) and two 20% Mn types (Mn1 and Mn2). -Renamed B9 alloy type as B91 to reflect current practice, and two supplemental designators were included to indicate the Mn+Ni levels of 1.0% maximum or 1.2% maximum. -Raised the maximum Mn content of the Ni1 alloy from 1.50% to 1.75%.
SFA-5.32/5.32M	21-1109	Adopted AWS A5.32/5.32M:2021 "Welding Consumables—Gases and Gas Mixtures for Fusion Welding and Allied Processes".



Synopsis of Significant Revisions

ASME Boiler & Pressure Vessel Code 2023 Edition

ASME Section IV; Heating Boilers

Note: This Synopsis does not address numerous editorial revisions of a minor nature made by the publisher that do not affect technical requirements.

Paragraph	ASME Record No.	Description of Changes
Various	21-418	Added "IV" to PRT designator in numerous places to comply with CA-1-2020 requirements.
Various	16-2718	Reworded multiple references to the Manufacturer's Data Report Forms for consistent terminology, and added provisions for the use of a new Manufacturer's Master Modular Data Report Form, Form H-1, for documenting modular boilers. <i>This is a significant revision</i>
Various	22-1724	Revised multiple paragraphs and Manufacturer's data reports to incorporate gender-neutral language.
HF-201(b)(1)	21-2026	Revised to reference a Note in Section II, Part D, Table 6A that limits the design temperature to 210F, reinstating an unintentionally deleted limit.
HF-301.1(c)	22-166	Reinstated the words "with a thickness less than that permitted by (a) and (b)" which had been inadvertently deleted during other revisions. This clarifies the use of the qualifying conditions given in subparagraphs (c)(1) and (2) where lesser thickness requirements may apply to alloy steel plates.
HG-301.2, HG-360.1, HF-301.1, HF301.2, HLW-309, and Form HLW-6.	21-2021	Replace "rolling" with "expanding" in the listed locations
Article 4, Nonmandatory Appendix P	23-90	Deleted Article 4 and Nonmandatory Appendix P that directed users to the rules of Section XIII for overpressure protection devices.
HG-401A(a)	21-816	Deleted second sentence: "The Manufacturer is responsible for ensuring that the boiler connections allow for the different types of pressure relief devices that could be installed within the design of the boiler based on system pressure design." This action results from a request by the editors for improved clarity.
HG-402A.2(a)-(c)	21-817	HG-402A.2(a): Revised to clarify that all pressure relief valves must be certified. HG-402A.2(b): Deleted set pressure tolerances for pressure relief devices due to their being described elsewhere. HG-402A.2(c): Deleted set pressure range limits on installations of multiple pressure relief devices. HLW-402A.2(d) thru (h): redesignated as (c) thru (g) respectively.



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HG-502.2(d)(2)(-b), HG-502.4(b)(2)(-b)	22-1494	HG-502.2(d)(2)(-b): replace "IV" after "Section" with "II, Part D, Tables 6A, 6B, 6C or 6D". HG-502.4(b)(2)(-b): replace "IV" after "Section" with "II, Part D, Tables 6A, 6B, 6C or 6D". These changes reflect Section IV's decision to shift the allowable stress tables to Section II, Part D and remove them from Section IV. <i>This is a significant revision</i>
HG-511(c)	22-126	Deleted the pneumatic testing stored energy calculations and limitations added in the 2021 Edition. These requirements proved to be an unreasonable hardship to industry. The remaining subparagraphs (d) thru (k) are now redesignated as (c) thru (j) respectively. <i>This is a significant revision</i>
HG-515.3(b)(14)	21-818	Reworded to use the word, "correct" instead of "proper" and "applied" instead of "stamped" to align with HG-530 in regards to the other acceptable methods applying marking information.
HG-530.1(g), HG-530.2 (g), HG-530.2 (g)(3), HG-530.2 (g)(4), HG-530.2(g)	21-1427	HG-530.1(g): Revised to clarify that meeting only one of the three available options is required, and reworded its subparagraphs for consistency. HG-530.2(g): Revised to clarify that subparagraphs (5) through (8) are not methods of meeting the provisions of HG-530.2(c), but pertain to paragraphs (1) through (4). Reformatted subparagraphs (5) through (8) as subparagraphs of the new language in paragraph (5).
HG-531	21-1632 21-355	HG-531(c): Added a new subparagraph to clarify requirements and indicate each individual part or accessory shall be marked. HG-531(d): Added a new subparagraph to describe removal of a "Part" nameplate or marking when incorporating the Part into a boiler to be certified. Redesignated previous subparagraphs (c), (d) and (e) to reflect these additions.
HG-710.2(b)	21-1905	Revised to clarify conditions under which stop valves on the inlet and outlet of a boiler are unnecessary.
HG-710.5	21-391	Revised to allow all valve designs that prevent leakage through the stem as stop valves.
HG-715(c), HG-803.1 HG-803.2, HG-803.3, HLW-810(a), HLW-902, HLW-903, HLW-904, HLW-906, HLW-907	22-314	HG-715(c), HG-803.2, HG-803.3, and HLW-810(a): Reworded to clarify requirements for drain valves on boilers of all types. HG-803.1: Reworded to add conditions where stop valves are not required on individual modular boilers. HLW-902: Added a new paragraph describing required appurtenances for HLW water heaters. HLW-903: Revised to address installation requirements for water heaters, incorporating rules previously found under HLW-904, HLW-906 and HLW-907 and deleting those paragraphs.



Synopsis of Significant Revisions

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HG-725.6	22-1321	Removed "with the additional requirement that the center pin be located at the vertical center line over the center of the welded contact surface" from HG-725.6.
Part HG, Article 8 & Various	21-1427	Added new Article 8, Modular Boilers to Part HG and deleted several references to modular boilers throughout the code wherever they previously appeared. <i>This is a significant revision</i>
Figure HW-715.1, Figure HW-745	21-1210	Figure HW-715.1: In sketch (a) added metrication to "1 in."; in sketch (b), added metrication to "1/2 in." Figure HW-745: In Step 1, replaced "vase" with "vice".
HLW-200(j)	20-2952	Added requirements for baked phenolic linings, incorporating Code Case 2613.
HLW-201.1	21-1007	Added subparagraph (d) reading "Laser-welded finned tubes meeting the requirements of HF-204.4 may be used in the construction of water heaters." This expands similar rules in Part HW to HLW boilers. <i>This is a significant revision</i>
HLW-310.2	21-1014	Revised to clarify that one handhole and one plugged threaded inspection opening is acceptable when either two handholes or two plugged threaded openings are required. Rearranged and reformatted other information in the additional subparagraphs for improved clarity.
HLW-413(c)	21-1497	Added HLW-413(c) providing guidance for tube attachment by Laser Beam Welding (LBW), and relabeling existing subparagraphs (c), (d), & (e) as (d), (e), & (f) respectively. This expands similar rules found in Part HW to HLW water heaters. <i>This is a significant revision</i>
HLW-505	20-401	Removed the 10 psi limitation on overpressure during hydrostatic test from HLW-505.1. Added new HLW-505.2 with provisions for maximum hydrostatic test pressure. Relabeled HLW-505.2 as HLW-505.3. <i>This is a significant revision</i>
HLW-602	21-819	Reformatted and reworded HLW-602, combining HLW-602.1, HLW-602.2, and HLW-602.3 for improved clarity.
HLW-602.5	21-354	Added a new subparagraph permitting removal of a "Part" nameplate or marking when incorporating the Part into a water heater to be certified. Similar rules exist for heating boiler and now exist for HLW water heaters.
HLW-800.1(c)	21-820	Reworded and reformatted for improved clarity.
HLW-801.7(b)	21-821	Revised last sentence for improved clarity.
Table 2-100	22-1061	Deleted ASME B16.14. This standard is not referenced.
Forms H-5 and H-5A	22-467	Remove the notarization note on Line 11 from Manufacturer's Certification entry on Forms H-5 and H-5A.
Mandatory Appendix 8	22-1757	Deleted Mandatory Appendix 8 and added a reference to ASME CA-1 for rules associated with reapplication of the ASME Mark.



Synopsis of Significant Revisions

ASME Boiler & Pressure Vessel Code 2023 Edition

Nonmandatory Appendix E	21-822	Deleted "Pressure" from title of "Valve, Pressure Relief" outlined in BPV Section IV to be consistent with title in BPV Section XIII.
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Synopsis of Significant Revisions

ASME Boiler & Pressure Vessel Code 2023 Edition

ASME Section V; Nondestructive Examination

Note: This Synopsis does not address numerous editorial revisions of a minor nature made by the publisher that do not affect technical requirements.

Paragraph	ASME Record No.	Description of Changes
Article 1, T-110(a) & T120(e)	20-2437	Revised T-110(a) (Scope) to delete the incomplete listing of NDE methods addressed in Section V. Added text to T-120(e) to indicate: "This written practice shall address the methods and techniques that are applicable to the organization's operations and..."
Article 1, T-120(e) & Mandatory Appendices III & IV	21-2047	Revised to reference SNT-TC-1A-2020, and deleted Mandatory Appendix III and IV. <i>This is a significant revision</i>
Article 1, T-120(h)	21-581	Adopted ANDE-1-2020 to update ANDE-1-2015.
Article 1, T-120(j)	21-433	Revised to clarify personnel certifications made to a previous Edition of Section V remain valid until their renewal
Article 1, T-150(a) & (b)	20-2600	Revised to require procedure demonstration performance on a specimen having a known discontinuity unless otherwise stated by the referencing Code. <i>This is a significant revision</i>
Article 1, T-150(d)(3)	21-647	Revised "effectively reveal" to "reveal."
Article 1, Mandatory Appendix I, I-121.2	20-352	Added definitions for "Dual Linear Array Search Unit" and "Linear Array Search Unit"
Article 1, Mandatory Appendix I, I-121.4	20-2043	Revised the definition of "Multidirectional Magnetization"
Article 1, Mandatory Appendix I, I-121.6	22-931	Deleted "magnifying aids" from the definition of "Direct Visual Examination".
Article 1, Mandatory Appendix I, I-121.7	20-69	Revised the definition of "Hood Test", listing distinctions specific to the Hood test.



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Article 1, Mandatory Appendix I, I-121.9	18-346	Added a definition for "Sizing Accuracy"
Article 1, Mandatory Appendix II, Table II-121	21-367	Revised General Notes (a), (c) and (d) clarifying requirements for additional training and experience requirements for individuals previously certified in another radiography technique.
Article 1, Mandatory Appendix II, II-122.1	21-2387	Reduce the number of CR and DR practical examinations for Level I & II personnel with the required additional CR/DR training from 5 each to a minimum of 2 each, and revise the requirements of each test specimen. For Level I & II personnel without the required additional CR/DR training the additional 8 practical examinations shall be raw, unfiltered digital images.
Article 2, T-223	22-1375	Corrected paragraph references to "VIII-288" and "IX-288" to read "VIII-282" and "IX-282" respectively.
Article 2, T-223 and Mandatory Appendix I, I-223	22-2157	Revised Paragraphs T-223 and I-223 to clarify the use of the lead letter "B" on radiographic film cartridges.
Article 2, Table T-276	20-2725	Added a General Note that the specified IQI hole and/or wire designation may not produce the required minimum sensitivity.
Article 2, Mandatory Appendix VIII, VIII-221.1(i)	21-1012	Revised to add a comma between laser and resolution (laser, resolution) by errata.
Article 2, T-277.1 & Mandatory Appendix IX, IX-277.1	21-366	Revised to clarify that the wire-type IQI placement is not required to span the full width of the weld if the sensitivity and density requirements are satisfied.
Article 4, Various	19-2943, 19-2944	1. Revised "time of flight", when used as an adjective, to "time-of-flight", and revised "time- of-flight", when used as a noun, to "time of flight". 2. Revised "backwall" to "back wall" or, when used as an adjective, to "back-wall", and revised "back-wall" to "back wall" when used as a noun.
Article 4, T-434.1.7	21-638	Added statements requiring compliance for Non-piping Technique 1 and Technique 2 calibration blocks.
Article 4, T-451	17-2035	Added a definition for High Alloy Steel



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Article 4, Mandatory Appendix II, Table II-440	22-440	Revised values in the Table for "Indication Limits % Full Screen" to reflect those found in the 2013 and prior Editions because the values that were changed in the 2015 Edition were incorrect. This is a significant revision.
Article 4, Mandatory Appendix III, III-479.1	21-2455, 22-442	Revised to clarify that using a manual or mechanized UT technique other than TOFD for initial flaw detection is required, due to the possible inability of detecting flaws in the lateral wave and back-wall TOFD "dead zones". Revised the term "mechanized" to "semi-automated or automated".
Article 4, Mandatory Appendix I & XI Nonmandatory Appendix F	22-1712	Replaced all instances of the word "paths" with the word "mode" for consistency.
Article 4, Mandatory Appendix VII, VII-421.2	20-1379	Revised to provide guidance for procedure qualification in accordance with Article 4 Mandatory Appendix VII when required by a referencing Code or Standard.
Article 4, Mandatory Appendix XI, XI-435 & XI-462.8.1	22-441	Corrected the reference to "ASTM E 2491" to read "SE-2491".
Article 4, Mandatory Appendix XI, XI-481.1.2	21-892	Remove the 1% rule due to redundancy with the amplitude fidelity rule in XI-461.1, and updated the paragraph reference.
Article 4, Nonmandatory Appendix J, Figure J-431	22-2224	Revised Note (2) to read: "For each increase in weld thickness of 2 in. (50 mm) or fraction thereof over 14 in. (350 mm), the hole diameter shall increase 1/16 in. (1.5 mm)."
Article 4, Nonmandatory Appendix P	14-2317	Revised the title of Figure P-452.2-2 from "Top Diffraction" to "Tip Diffraction".
Article 4, Nonmandatory Appendix S	17-1862	Added Nonmandatory Appendix S to address Ultrasonic Examination of Brazed Joints. This is a significant revision.
Article 6, Table T-672	20-2730	Add HAZs to the first row of Table T-672
Article 6, T-676.4	19-2863	Revised to include "Glasses and Lenses" consistent with T-777.2.
Article 6, T-692(c)	21-370	Removed "number or letter designation".



Synopsis of Significant Revisions

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Article 7, T-765	20-786	Revised for consistency with SE-709.
Article 7, T-777.2	21-369	Revised for consistency with T-676.4.
Article 8, Mandatory Appendix XI	19-1983	Added new Mandatory Appendix XI, describing tangential field examination for detection and measurement of surface breaking cracks. <i>This is a significant revision.</i>
Article 9, T-921.3	20-1233	Revised to allow the use of “characters” in addition to lines and other visible artifacts for procedure demonstration
Article 9, T-953	18-2052	Amended Remote Visual to accommodate deployment mechanisms like UAS/UAV & robots, allowing an exception for Direct Visual Equivalence.
Article 10, Mandatory Appendix XI, XI-1063.6	21-1003	Reversed the sequence of R_B and R_C in the equation for final system correction factor (FSCF)
Article 12, Mandatory Appendix III	20-779, 20-780	Added a mandatory appendix describing the methodology to determine the sensitivity of the instrumentation used in an Acoustic Emission test, according to the location methodology used, zonal or planar. <i>This is a significant revision.</i>
Article 12, Nonmandatory Appendix A		Substantially improved graphic images from those shown in the prior Edition.
Article 22, SE-999	20-2651	Adopted ASTM E 999-20 to update SE 999
Article 22, SE-1030	21-2334	Adopted ASTM E1030-2021 to update SE-1030
Article 22, SE-1114	21-1073	Adopted ASTM E1114-2020 to update SE-1114
Article 22, SE-1165	21-1071	Adopted E1165-2020 to update SE-1165
Article 22, SE-2597	22-889	Deleted SE-2597
Article 23, SE-213	22-891	Adopted ASTM E213-2022 to update SE-213
Article 23, SE-273		Adopted ASTM E273-2020 to updated SA-273
Article 23, SE-745	20-2679	Adopted ASTM A745 – 2020 to update SA-745
Article 23, SE-797	21-2333	Adopted ASTM E797-2021 to update SE-797



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Article 23, SE-2491	20-2680	Adopted ASTM E2491 – 2018 as SE-2491.
Article 23, SE-2700	20-2681	Adopted ASTM E2700 – 2020 to update SE-2700
Article 23, SD-7091	21-1072	Adopted ASTM D7091-2021 to update SD-7091
Article 25, SD-1186	22-1474	Deleted SD-1186.
Article 26, SE-243	20-2652	Adopted ASTM E243 – 2018 to update SE-243.
Article 29, SE-750	21-2328	Adopted ASTM E750-2020 to update SE-750
Article 29, SE-976	22-888	Adopted ASTM E976-15(2021) to update SA-976
Article 29, SE-1067	20-793	Adopt ASTM E1067-18 to update SE-1067
Article 29, SE-1118	20-2862	Adopted ASTM E1118–2020 to update SE-1118
Article 29, SE-1419	20-2863	Deleted ASTM E1419 – 2015.
Article 29, SE-2075	20-2864	Adopted ASTM E2075–2020 to update SE-2075
Article 31, SE-2261	22-890	Adopted ASTM E2261-17(2021) to update of SE-2261.



Synopsis of Significant Revisions

ASME Boiler & Pressure Vessel Code 2023 Edition

ASME Section VIII, Division 1; *Unfired Pressure Vessels*

Note: This Synopsis does not address numerous editorial revisions of a minor nature made by the publisher that do not affect technical requirements.

Paragraph	ASME Record No.	Description of Changes
U-2(j), Nonmandatory Appendix NN	13-342	Added a new paragraph clarifying the responsibilities of the vessel Manufacturer to provide detailed construction requirements to a Part Manufacturer when specifying Parts. These details include design, testing, examination, and other pertinent information needed to ensure the Part is suitable for inclusion in the final pressure vessel. <i>This is a significant revision</i>
Table U-3	22-1512 22-1835 22-392	Added ASME E1820 (J integral toughness test) Updated year of acceptable edition for ASCE-7 to 2022. Updated year of acceptable edition for ASME B16.1 to 2020. Updated year of acceptable edition for ASME B16.5 to 2020. Updated year of acceptable edition for ASME B16.42 to 2021. Updated year of acceptable edition for ASME B16.47 to 2020. Updated year of acceptable edition for PCC-2 to 2022. Updated year of acceptable edition for ASTM E127 to 2020. Updated year of acceptable edition for ASTM E186 to 2020. Updated year of acceptable edition for ASTM E208 to Latest Edition. Updated year of acceptable edition for ASTM E280 to 2021. Updated year of acceptable edition for ASTM E446 to 2020. Updated year of acceptable edition for AWS A4.2M to Latest Edition. Updated year of acceptable edition for ISO 148-1 to Latest Edition. Updated year of acceptable edition for ISO 148-2 to Latest Edition. Updated year of acceptable edition for ISO 148-3 to Latest Edition. Added Note 4, prohibiting the use of flanges or flanged fittings that rely on and meet a B16 code case.
Various	21-1068	Revised "PRT" to read "PRT VIII-1" in UG-116, Fig. UG-116, UG-117, Fig. UG-118, UHT-115, ULW-90, UIG-116, UIG-120, Form U-2, and Form U-2A for conformance with CA-1-2020.
UG-10	16-2249	Deleted the phrases "Recertification by an Organization Other Than the Vessel or Part Manufacturer. Not permitted." and "Recertification by the Vessel or Part Manufacturer" previously appearing in multiple locations, replacing these phrases with an opening sentence to UG-10 stating: "Material recertification and requalification is only allowed by the vessel or part Manufacturer." Revised the phrase "general specification" previously appearing in multiple locations with "general requirements specification" for improved clarity.
UG-11(e)	20-2709	Revised by changing "welding" to "joining" to be inclusive of brazing as an acceptable method for constructing subcontracted Parts.



Synopsis of Significant Revisions

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UG-19(a)(3)	21-2126	Removed “Dependent Pressure Chamber” from Mean Metal Temperature Design
UG-35.2(b)(2)	18-381	Revised to replace “holding” with “locking”, and revised the associated subparagraphs to clarify applicability to potential failure of other locking elements, as well as potential overstressing of either locking or holding elements.
Figure UG-39(a), Figure UG-39(b)	20-1128	Figure UG-39(a): Added correct U_1 dimension in Section A-A. Changed existing U_1 to U_4 in Section A-A. Corrected U_1 dimension to ID of shell instead of OD in Section A-A Corrected U_1 dimension to ID of smaller nozzle instead of OD Corrected “d” as defined in Figure UG-34 arrow location to point to ID instead of OD Figure UG-39(b): Corrected U_5 dimension to ID of shell instead of OD in Section B-B Added U_4 dimension in Section B-B Corrected U_3 dimension to ID of shell instead of OD Corrected U_5 dimension to ID of shell instead of OD
Table UG-44-1	21-2011	In Note (1), deleted the unnecessary brackets in the numerator of the formula for F_M .
UG-46(a), UG-46(a)(2)	21-1768	Revised the words “with Configuration a, b, or c as shown in Figure UHX-12.1 or Figure UHX-14.2” to read “having shells integral with the tubesheets” to improve clarity.
UG-79(d)(1)	21-2298	Revised reference to UW-35(d) to UW-35(e).
Figure UG-84.1, Figure UG-84.1M	21-1811	Figure UG-84.1: Added a new curve for materials having a minimum specified yield strength of 80 ksi. Figure UG-84.1M: Added a new curve for materials having a minimum specified yield strength of 550 MPa. These are significant revisions
UG-84(c)(2)(-a)	20-2621	Revised to correct units of “ft-lbf” to “ft-lb” and added SI unit values for Charpy fixed energy.
UG-84(d)(3)	21-2636	Added new subparagraph addressing requirements for impact testing of Diffusion Welded Heat Exchanger assemblies.
UG-84(f)(2)	19-1852	Deleted “including cooling rate”, making the maximum prescribed cooling rates the upper limit for the test requirements.
UG-84(g) and (h)	21-544	This revision simplifies rules for qualifying WPSs when toughness testing is required. It eliminates the need to take subsized specimens representing each welding process when a multi-process test coupon is used. The new words explain how the results of impact testing are highly dependent on notch location relative to bead overlap in the weld metal and the amount of weld metal and base metal is included in the HAZ test specimen. This is a significant revision.



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UG-84(h)(2)(-b)	19-539	Removed the requirement that materials used in production be in “the same heat treated condition for PQR plate” for P. No. 1 and Gr. 1&2 materials when qualifying a WPS with impact testing. <i>This is a significant revision.</i>
UG-85	21-2614	Revised heat treatment condition markings of materials to be consistent with SA-20/SA-20M, para. 13.1.2. Replaced “letter “T”” with “letters “MT” (denoting material treatment)”, and replaced “G” with “ “G” (denoting green)”.
UG-93(d)(3), UNF-56(d)(1)	17-875	UG-93(d)(3): Deleted “both” and “remaining” to simplify the text. UNF-56(d)(1): Added (540°C) after 1000°F to provide the SI equivalent.
UG-98(c)	20-2370	Revised “operating” to “coincident” to address using multiple design pressures and temperatures on a single pressure vessel.
UG-99(h), UG-100(c)	18-278	Replaced UG-99(h) and UG-100(c) with requirements for calculating the minimum test temperature, deleting references to Figure UCS-66.2, Note (6). These revisions address situations demonstrated to be nonconservative, potentially allowing conditions for brittle fracture to exist during pressure testing. <i>This is a significant revision</i>
UG-101(a)(5)	14-345	Added new paragraph to address sharing of proof testing reports between Manufacturers owned by the same corporate entity.
UG-101(m)	22-874	Revised UG-101(m)(2) to allow the use of MTR tensile strength values as an alternative method of determining the value of S_{avg} . <i>This is a significant revision</i>
UG-119(c), UG-119(c)(2)	20-2134	UG-119(c): Revised “may” to “shall”, and added laser annealing as an acceptable marking method. UG-119(c)(2): Revised, and added subparagraphs (3), (4), and (5) to address rules for laser annealing.
UG-120(b)(3)	21-1768	Deleted the phrase “as defined in UHX-3.2” due to revisions to Part UHX invalidating this reference.
UG-150, Mandatory Appendix 10 & 11, Nonmandatory Appendix M & PP	22-1897	UG-150: Revised introductory paragraph. Mandatory Appendix 10: Deleted 10-16, Inspection of Pressure Relief Valves and renumbered current 10-17 to 10-16; Mandatory Appendix 11: Deleted Nonmandatory Appendix M: Deleted paragraphs M-5.2, 5.3, 5.4, 5.5, 5.6, 5.7, and 5.8; Nonmandatory Appendix PP: Deleted.
UG-150(e)	14-2498	Deleted the phrase “unless the vessel is otherwise protected against overpressure” to eliminate potential confusion.
UG-151(e)	20-2370	Added new subparagraph (e) to address considerations for overpressure protection of vessels having multiple design pressures.
UG-153(a) UG-154(c)(1)(-c)	21-1634	UG-153(a): Corrected reference to “UG-54(c)” to read “UG-154(c)”. UG-154(c)(1)(-c): Deleted extraneous close parenthesis.
UG-156(b)(2)	21-1634	Revised reference to UG-156(b)(6) to simply (g), meaning UCS-156(g)



Synopsis of Significant Revisions

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UW-2(a)(3)(-b)(-3), Table UCS-23, Table UHA-23	22-1900	UW-2(a)(3)(-b)(-3): Revised references to Supplementary Requirements S1 and S3 by referring to SA-450, Section 25 regarding NDE methods. Table UCS-23: Removed SA-557. Table UHA-23: Removed SA-731.
UW-3(c)	20-1265	Revised "Van stone laps" to "lap joint stub ends" clarifying for code users what was intended by "Van stone lap".
UW-12(f)	21-2127	Corrected "UW-27(b)" to "UW-27" due to another revision.
Figure UW-13.2	20-1165	Revised Note (a) to clarify that it does not apply to sketches (r) and (s).
UW-16(d)(1), Figure UW-16.1	21-699	Revised UW-16(d)(1) and the Note below Figure UW-16.1, sketches (i), (j), (k), and (l) to clarify that BOTH the dimensions t_1 and t_2 in each weld shall meet the required weld sizing.
UW-16(f)(1)	18-445	Added reference to UW-16(c) to clarify requirements for full penetration welded attachments of "saddle on" nozzles or fittings
UW-20, Nonmandatory Appendix A	20-2144	Combined tube-to-tubesheet weld joint strength rules of Appendix A into UW-20, rewriting and reformatting UW-20, relocating Figures A-2 & A-3 as new Figure UW-20.2 and Figure UW-20.3. Deleted Nonmandatory Appendix A. This is a significant revision.
UW-20.3	21-2101	In the nomenclature, corrected " L_{Min} " to " L_{Max} "
UW-28(d)	22-1615	Revised to permit simultaneous qualification of a welding procedure specification by multiple organizations under the rules of QG-106.4 of Section IX. This is a significant revision
UW-35, UW-36	21-2298	UW-35: Revised the title to "Completed Welds", clarifying that the requirements include nozzle joints and other groove welds on a vessel. Created a new subparagraph (b) to separate the specific requirements for butt welds in (a) from weld surfaces as addressed in (b). Previous subparagraph (b) is now (c), and specifically refers to "undercut" to clarify what is meant by "a reduction in thickness". Previous subparagraphs (c) and (d) are now (d) and (e) respectively. In new subparagraph (e), replaced "weld grooves" with "butt welded joints". UW-36: Revised "adequate penetration" to "fusion" which is more appropriate for fillet welds. Specifically refers to "undercut" to clarify what is meant by "a reduction in thickness". Revised reference to "UW-35(b)" to "UG-35(c)" due to the revisions described above.
UW-55, Mandatory Appendix 42	21-243	Added nondestructive requirements for diffusion welded components in UW-55 and deleted Mandatory Appendix 42 after incorporating its elements into the body of the code. This is a significant revision
UCS-6, Table UCS-23,	15-990	Removed SA-283, Grades A and B due to their deletion from the specification.
Table UCS-23,	16-2100	Removed SA-557. Added SA/IS 2062 Grade E250, sub-qualities A, BR, B0, C. Added Note 1 regarding the potential supply of material using the "Normalized Rolling" process associated with these materials.



Synopsis of Significant Revisions

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Table UCS-56.1	21-87	Changed "50(28)" to read "Less than or equal to 50(28)" in the body of the table. Added (a) before the existing General Note and added new General Note (b) to address interpolation of intermediate values. Replaced the second sentence of Note 1 to improve clarity.
Table UCS-56-1, Table UCS-56-2	17-875	Deleted "Over 5 in." PWHT variables and deleted "to 5 in." from the "Over 2 in. to 5 in." header for improved clarity.
Table UCS-56-1 thru Table UCS-56-9	21-2308	Revised "Minimum Holding Time" headers, eliminating redundancies and improving clarity
Table UCS-56-2, Table UCS-56-3, Table UCS-56-4	20-2715, 21-984	Table UCS-56-2: Revised General Note (d)(2). Table UCS-56-3 & Table UCS-56-4: Revised General Notes (b)(1), (b)(2), (b)(3), and (b)(4). These revisions expand the exemption from PWHT for pipe and tube to include wrought and forged butt weld fittings. <i>This is a significant revision</i>
Figure UCS-66 & Figure UCS-66M; Note (1)(d), Note 2(b)	16-1823, 16-2100	Note (1)(d): Added SA/IS 2062 Grade E250, sub-qualities A, BR, B0, C as a Curve A material. Note 2(b): Added "normalized and tempered, or liquid quenched and tempered as permitted in the material specification, and" to clarify that all of these processes are acceptable premises for upgrading the assigned toughness curve from Curve A to Curve B. <i>This is a significant revision</i>
UCS-66(c)	22-1550	Adds a statement allowing a declaration of production to fine grain practice on the material test report or certificate of compliance on forged flanges to be sufficient evidence of that condition. <i>This is a significant revision.</i>
Figure UCS-66.2	18-278	Deleted Note (6) in its entirety, and all references to Note (6). Deleted reference to UG-99(h) & UG-100(c) in Step 6. These revisions address situations demonstrated to be nonconservative, potentially allowing conditions for brittle fracture to exist during pressure testing. <i>This is a significant revision</i>
Figure UCS-66.3, Sketch (f)	21-1636, 22-1117	Corrected the formula " $t_{g3} = t_A/4$ " to " $t_{g3} = t_B/4$ "
UCS-67(a)(3), UHA-51(f)(4)	20-1221	Revised UCS-67(a)(3) and UHA-51(f)(4) to apply correct terminology to welding consumables and improve clarity. The term "batch" is inappropriate for SAW fluxes, which are defined by a "Lot Class". Filler metals are defined by either "heats" or "lots".
UCS-85	20-1641	Revised UCS-85(b), (c), (d), (e), (g), (h), and (i) for improved clarity of intent. <i>This is a significant revision.</i>
UNF-19(g)	08-1300	Added new subparagraph to address welding filler metals applicable to 35Ni-23Cr-7.5Mo-N austenitic alloy, UNS N08354.



Synopsis of Significant Revisions

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Table UNF-23.3	08-1300, 20-836, 22-1713	Added 35Ni-23Cr-7.5Mo-N austenitic alloy, UNS N08354, for SB-673 (welded pipe) and SB-674 (welded Tube). Added UNS N06617 to SB-626 as an acceptable material. Deleted UNS N08904 from SB-649.
Table UNF-23.5	20-87, 20-2893, 22-1432	Deleted UNS R60705 from SB-523. Added SB-752 Alloy Grades 702C and 705C [UNS R61702 and R61705]
UNF-56(d)(1)	17-875	Added (540°C) after 1000°F to provide the SI equivalent.
Table UHA-23	16-1995, 17-875, 21-2623, 21-2624, 22-1924	Added UNS N08904 (SA-249, SA-479) as an acceptable material. Added UNS S31002 (SA-213, SA-312) as an acceptable material. Added UNS S32707 (SA-789, SA-790) as an acceptable material. Added UNS S43932 to SA-240 as an acceptable material.
Table UHA-32	21-2301, 21-2308	Table UHA-32-1: Deleted reference to SA-240 in Note (a) since Type 410 has a carbon content range of 0.08 to 0.15 wt. % and cannot meet the 0.08 wt % maximum carbon content limit. Tables UHA-32-1 and UHA-32-2: Revised Note (a) in to clarify that exemption from PWHT when applying radiography applies only for full penetration butt welds. Tables UHA-32-1 thru -7: replaced "min./in." with "for each additional inch" eliminating redundancies in the tables for holding time calculations.
UHA-51(d)(4)	13-2042	Added SA-453, Gr. 660 A&B materials as being exempt from impact testing at MDMTs no colder than -320F.
UHA-51(f)(3)	21-661	Revised to exempt ER310 or SFA-5.4 E310-15 or 16 filler metal, eliminating conflicts with UHA-51(f)(4)(-e).
UCL-27(a), UCL-27(b), UCL-27(c)	20-510	UCL-27(a): Reformatted previous UCL-27 to become UCL-27(a). UCL-27(b): Added new subparagraph, requiring the exemption temperature for the base material to control the MDMT for components with applied corrosion resistant linings. UCL-27(c): Added new subparagraph requiring the MDMT for components with corrosion resistant integral cladding to be governed by the warmer of the two impact test exemption temperatures when both the base material and cladding material contribute strength. <i>This is a significant revision</i>
Table UHT-56	20-2729	Revised to waive PWHT requirements of SA-353 and SA-553 Type I materials at thicknesses over 50 mm (2 in.) under qualifying conditions.
UHT-82(k)	20-2729	Added new subparagraph listing the qualifying conditions for this PWHT exemption.
UHT-84	21-2298	Revised reference to UW-35(a) to UW-35(b)
ULW-75	17-875	Deleted "For layered vessels, the minimum thickness permitted for layers is 1/8 in. (3 mm)" to eliminate redundancy with ULW-16(d).



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Part UHX	13-163, 15-121	Realigned paragraphs and calculation steps for consistency between the heat exchanger types. Revised the shell and channel coefficients to be based on the mean diameter instead of the inside diameter consistent with PTB-7. Applied editorial revisions for consistency in the equations and calculation procedure descriptions, and revised the nomenclature consistent with these changes. Revised existing channel coefficients and channel stress calculations for integral conical channels, and added new channel coefficients for cones to the calculation procedures and nomenclature. Revised existing figures and added new figures supporting these changes. <i>This is a significant revision.</i>
Part UHX	21-1768	Deleted technical requirements from Part UHX that appear in 4.18 of Division 2, and added a table referencing specific paragraph locations. <i>This is a significant revision</i>
Figure UHX-4.1, sketches (a) and (b)	22-412	Revise references to UHX-4(i) to correspond with a paragraph renumbering from another action.
UHX-13.10.3, UHX-14.3	10-679	Deleted the text of UHX-13.10.3 and UHX-14.3, consolidating Part UHX nomenclature to a single location under UHX-5.1.
Fig. UHX-13.10.3-1	22-822	Added Figure UHX-13.10.3-1 after its previous inadvertent deletion.
Mandatory Appendix 2, 2-3, 2-5(b), 2-7(a), 2-7(b)	21-2000, 21-2627, 22-622,	2-3: Revised the definition of A_b in the nomenclature to reference PCC-1, Appendix H. 2-5(b): Revised "eq. (d)(3)" to "eq. (e)(4)" in 2-5(b)(1) and "eq. (e)(4)" to "eq. (e)(5)" to resolve references that were not updated with previous revisions to Appendix 2. 2-7(a) and 2-7(b): Corrected references to flange sketches in Figure 2-4
Mandatory Appendix 5, 5-3(f), Figure 5-1	20-758, 22-372	5-3(f) & Figure 5-1: Revised to clarify the meaning of L_{limit} as being a length determined by $0.5 \cdot \sqrt{Rt_f}$. 5-3(f): Revised to allow straight flanges longer than L_{limit} which do not meet UG-27, provided the general primary membrane stress P_m in the straight flange is limited to S for mechanical loads only when the design of the flexible shell element is performed by numerical analysis. Figure 5-1: Added markings referenced in 5-3(f). These revisions offer an option for design by analysis as an alternative to design by rule. <i>This is a significant revision</i>
Mandatory Appendix 9, 9-5(c)(8)	19-1785	Corrected references to sketches "(k) and (l)" with "(j) and (k)".
Mandatory Appendix 10, 10-13(b)(7)	18-1027, 21-1092	Replaced the phrase "each welder who welded on the vessel" with "only those welders/welding operators who welded on the vessel or part" Added a requirement for maintaining continuity records for performance qualifications of welders and brazers for at least three years. <i>This is a significant revision</i>



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Mandatory Appendix 10, 10-16	22-1897	Deleted 10-16 "Inspection of Pressure Relief Valves", which is now addressed in Section XIII. Redesignated 10-17 "Certification" as 10-16.
Mandatory Appendix 11	22-1897	Deleted. The rules for capacity conversions of safety valves now appear in Section XIII.
Mandatory Appendix 19, 19-3	15-990	Removed SA-283, Grades A and B due to their deletion from the specification.
Mandatory Appendix 20, 20-2	21-114	Replaced "tensile and yield" with "mechanical property". Limited applicability of paragraph 4 to carbon and low allow steels, and replaced "must" with "shall" at the end of the same paragraph.
Mandatory Appendix 22, 22-5	22-2370	Added a reference to UG-151(e) in subparagraph (a).
Mandatory Appendix 26	21-1769	Deleted technical requirements from Mandatory Appendix 26 that appear in 4.19 of Division 2, and added a table referencing specific paragraph locations. <i>This is a significant revision</i>
Mandatory Appendix 31, Table 31-1	13-866	Added SA 387, Grade 22, Class 2 and other relevant Cr-Mo steels
Mandatory Appendix 41, 41.5, 41.10.1(b)	19-1935	In Step 8, Calculation of M^* , was corrected by replacing 'W' with 'Wm1', which represents the operating condition moment. The value for " h_r " corrected to "1.563" in 45-5 for consistency with 41-10.1(b). Other numerical changes reflect correct values for "Wm1" instead of "W".
Mandatory Appendix 41, 41-7	21-1768	Replaced references to Figures UHX 11.5.2.1 & 11.5.2.2 previously found in Part UHX, redesignating these figures as Figure 41-7-1 & Figure 41-7-2 respectively and relocating them Mandatory Appendix 41.
Mandatory Appendix 42, 42-3(b)	21-2254	Revised the acceptance criteria to state: "Acceptance Criteria. There shall be no relevant indications on or adjacent to the weld line. Only indications with major dimensions greater than 1/16 in. (1.5 mm) shall be considered relevant." The deletion of Mandatory Appendix 42. (under 21-463) makes this action moot. <i>This is a significant revision.</i>
Mandatory Appendix 44, 44-5	21-675	Added new subparagraph (i) to address the use of internal stiffening rings as needed to support loads on cold stretched vessels.
Mandatory Appendix 45, 45-4, 45-5(a), 45-6	15-1795	45-4: Deleted reference to 45-5 45-5: Deleted subparagraph (a) and redesignated the remaining subparagraphs of 45-5. 45-6: Replaced existing requirements with new requirements addressing the design of plate frame heat exchangers. <i>This is a significant revision</i>



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Mandatory Appendix 47, 47-1(d), 47-2, 47-2(b)(1), 47-3(a)(1), 47-3(a)(2), 47-3(b)(1), 47-3(b)(2); 47-4, 47-6(b), Table 47-5, Endnote 79	21-1770, 21-2030	47-1(d): Added to clarify that the person(s) in responsible charge may be subcontracted. 47-2: Deleted "within the Manufacturer's organization" from the first sentence. 47-2(b)(1) and 47-3(a)(1): Deleted "accredited" and added "having an accredited program" 47-3(a)(2), (b)(1), and (b)(2): Deleted "a minimum number of years of experience" and "in the design of pressure vessels", replacing these with the phrase "sufficient experience in the design of pressure vessels as" 47-4: Revise opening paragraph to clarify that the individuals, engaged in design activity while under the responsible charge of another individual, can be subcontracted. Added reference to 47-3; 47-6(b). Deleted "under 47-3"; Table 47-5: Revised reference "2.3.3.3(d)(2)(-f)" to "2.3.3.3(c)(2)(-f)". Endnote 79: Revised "1778" to "10-1778" <i>This is a significant revision</i>
Nonmandatory Appendix A	20-2144	Deleted, relocating its contents into UW-20. <i>This is a significant revision</i>
Nonmandatory Appendix M, M-5.1, M-5.2 thru M-5.8	22-1897	Due to relocation of overpressure protection requirements to Section XIII, this action incorporates the requirements of M-5.1 into M-5, and then deletes M-5.2 through M-5.8.
Nonmandatory Appendix P, P-1	21-1595	Deleted "Mandatory Appendix 1" leaving the reference pointing only to Section II, Part D.
Nonmandatory Appendix S, S-1;	21-365	Corrected "S_T" to "S_i".
Nonmandatory Appendix Y, Y-7(a)	21-365	Corrected "S_T" to "S_i".
Nonmandatory Appendix HH, HH-1, HH-5.2, HH-5.3, HH-6.2, Form QEXP-2	20-2144	HH-1: In subparagraphs (a) & (b), replaced "Table A-2 in Nonmandatory Appendix A" with "Table UW-20.1" and also replaced "Nonmandatory Appendix A" with "UW-20" HH-5.2: Replaced "A-2 and A-2" with "UW-20.4" HH-5.3: Replaced "A-1 and A-3 of Nonmandatory Appendix A" with "UW-20.4" HH-6.2: Replaced "A-2 and A-2" with "UW-20.4" Form QEXP-2: Replaced various references to Nonmandatory Appendix A with new references in UW-20.
Nonmandatory Appendix JJ, Figure JJ-1.2-3	20-1218	Within the diamond referencing UHA-51(f)(4)(-b), replaced the text "Is each heat/batch combination of wire and flux pre-use tested?" with "Is each combination of heat of filler metal and lot of flux pre-use tested?"; correcting the terminology used for these welding consumables.
Nonmandatory Appendix LL, LL-1	21-1768	Revised references to "UHX-13 and UHX-14" to read "UIG-34 and Appendix 41" due to revisions in Part UHX.



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Nonmandatory Appendix NN, NN-3(c), NN-4(c), NN-5(c), Table NN-6-1, Table NN-6-5, Table NN-6-6, Table NN-6-7, Table NN-6-9	13-342, 20-2370, 21-1634, 21-1768	NN-3(c): Added “or in the case of vessel parts intended for use within a completed pressure vessel” to the end of the last sentence. NN-4(c): Added new subparagraph (c), reading “<i>A Manufacturer of a complete pressure vessel specifies a part of a vessel</i> for which a Partial Data Report is required in UG-120(c). [See NN-5(c).]” NN-5(c): Added “Example (3)” as a new subparagraph (c) with its supporting subparagraphs, addressing the scenario added in NN-4(c). Table NN-6-1: Added a reference to UG-151(e) to address considerations for overpressure protection of vessels having multiple design pressures. Deleted “Heat Exchanger Design” section at the bottom of the table due to revisions in Part UHX. Table NN-6-5: Added references to new user responsibilities in U-2(j). Table NN-6-6: Added references to new user responsibilities in U-2(j). Table NN-6-7: Added references to new user responsibilities in U-2(j). Table NN-6-9: Corrected the second listed reference to “Section XIII, 4.1.2(a)” in the row addressing overpressure protection devices to “Section XIII, 8.2(d)”.
Nonmandatory Appendix PP	22-1897	Deleted. This appendix previously contained a cross reference listing for new paragraphs in Section XIII to help code users find associated overpressure protection requirements previously found in this Division that have been relocated to Section XIII.
Endnote 70	21-2127	Deleted. This endnote has no reference in the code.
Code Case 3022	19-2904	Adopted this Code Case waiving production impact testing of Category B welds under qualifying conditions when UG-84(I)(1) requires production impact testing. <i>This is a significant revision. This is also an upcoming code revision for the 2025 Edition.</i>
Code Case 3063	22-657	Adopted Code Case 3063 for the Use of Pure Isotropic Molybdenum in code construction



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ASME Section VIII, Division 2; *Alternative Rules for Unfired Pressure Vessels*

NOTE: This Synopsis primarily addresses revisions affecting technical content. It intentionally avoids addressing numerous revisions of a simply editorial nature not affecting technical content.

Paragraph	ASME Record No.	Description of Changes
Various	21-1068	Revised "PRT" to read "PRT VIII-2" in 2.3, 2-C.1, Form A-2, 2-F.1, 2-F.3, 2-F.4 and Fig. 2-F.1 for consistency with CA-1-2020.
Table 1.1	22-2202 22-1836 22-1512 22-393	Updated referenced edition of API 579-1/ASME FFS-1 to 2021. Updated year of acceptable edition for ASCE-7 to 2022. Added ASME E1820 (J integral toughness test). Updated year of acceptable edition for ASME B16.5 to 2020. Updated year of acceptable edition for ASME B16.47 to 2020. Updated year of acceptable edition for PCC-2 to 2022. Updated year of acceptable edition for ASTM E127 to 2020. Updated year of acceptable edition for ASTM E186 to 2020. Updated year of acceptable edition for ASTM E208 to Latest Edition. Updated year of acceptable edition for ASTM E280 to 2021. Updated year of acceptable edition for ASTM E446 to 2020. Updated year of acceptable edition for AWS A4.2M to Latest Edition. Updated year of acceptable edition for ISO 148-1 to Latest Edition. Updated year of acceptable edition for ISO 148-2 to Latest Edition. Updated year of acceptable edition for ISO 148-3 to Latest Edition. Added Note 2, prohibiting the use of flanges or flanged fittings that rely on a B16 code case.
Part 1, 1.2.4.2(b)	20-1592	Revised 1.2.4.2(b) to correct "API RP 560" to read "API STD 560".
Part 2, 2.2, 2.3.3, 2-A.2, 2-B.2	21-2598	Removed requirements for a certifying engineer to certify a UDS and MDR for vessels designed by rule, except as noted in paragraphs 2.2.1 and 2.3.3. <i>This is a significant code revision</i>
Part 2, 2.3.1.2, 2.3.1.3; Annex 2-C, 2-C.1.1(c); Annex 2-D; Form A-2; Annex 2-F, 2-F.1(h), (i)(1) & (2), & (j)(2) 2-F.3, 2-F.4.1(a)(2); Figure 2-F.1; Annex 2-G, 2-G.1,2-G.6.2	21-1068	Corrected "PRT" to "PRT VIII-2".



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Part 2, Annex 2-B, 2-B.1(b)	21-1342	Corrected reference "2-B.2.4" to "2-B.4".
Part 2, Annex 2-C, 2-C.3.1(d)	21-1092	Revised to add welder and brazer performance qualification continuity records to the list of documentation that must be maintained for at least three years.
Part 2, Annex 2-E; Part 9, 9.1, Annex 9-B	22-1897	Deleted 2-E.16, Inspection of Pressure Relief Valves; Revised Note preceding 9.1, and Deleted Annex 9-B. These revisions implement the relocation of technical requirements for overpressure protection devices to Section XIII.
Part 2, Annex 2-F, 2-F.5(a)(3)	19-693	Revised to allow welding of the nameplate to a bracket welded to the skirt or other permanent attachment instead of to the vessel itself.
Part 3, Table 3.1	13-866	Adds SA 387, Grade 22, Class 2 and other relevant Cr-Mo steels.
Part 3, Table 3.2	13-2042	Adds SA-320, Type 66 Cl. A & B
Part 3, 3.2.7.1	21-2614	Revised heat treatment markings of materials to be consistent with SA-20/SA-20M, para. 13.1.2. Replaced "letter "T"" with "letters "MT" (denoting material treatment)", and replaced "G" with ""G" (denoting green)".
Part 3, 3.3.6.6	20-510	Adds a new paragraph that establishes Low Temperature Operation rules for vessel with applied linings or cladding. <i>This is a significant revision</i>
Part 3, Figures 3.3, 3.4, 3.7, & 3.8; Table 3.12; Table 3.13	15-2810	Editorially revised titles of Figures 3.3, 3.4, 3.7, 3.8, Table 3.12, and Table 3.13 to add "welded". Revised associated wording in 3.11.2(b)(1), 3.11.2.9(b), 3.11.7.6(b)(2), 3.11.2.3(a), and 3.11.2.5(a) by adding "welded" to clarify applicability of the requirements to welded parts.
Part 3, Table 3.5	13-2042	Revised to separate SA 453 Gr. 651 and Gr. 660, and exempt Gr. 660 Cl. A & B from impact tests at MDMTs no colder than -320F.
Part 3, Figure 3.6/3.6M	21-1371	Added arrowheads to the right end of the acceptance criteria line on the figure.
Part 3, 3.11.2.4(a)	22-1550	Adds a statement allowing a declaration of production to fine grain practice on the material test report or certificate of compliance on forged flanges to be sufficient evidence of that condition. <i>This is a significant revision.</i>
Part 3, 3.11.2.4(b), 3.11.6.1(b)	21-94	Relocated SA-320, SA-437, SA-508 Gr 5 cl2, and SA-540 (except Table 2, Note 4) from 3.11.2.4(b) to Para 3.11.6. Adds new paragraph 3.11.6.1(b) for bolting materials. Revised current paragraph 3.11.6.1(b) to 3.11.6.1(c). Replaced all references of "See 3.11.2.4(b)" in Table 3.4 and Table 3.5 with "See 3.11.6.1(b)". These revisions resolve inconsistencies with the listings for bolting materials.



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Part 3, 3.11.2.5(d)	21-2510	Adds "general" in front of "primary membrane stress" for clarity and consistency with Part 5, Para. 5.2.2.2. Also adds "3.11.2.4(a)," in front of "or the impact test temperature" to clarify the pressure-temperature rating basis can be used on forged ASME B16.5, ASME B16.47, and LWN flanges to establish a "coincident ratio" allowing a further reduction in the basic exemption temperatures given for those components.
Part 3, 3.11.4.5(c)	21-661	Revised to exempt ER310 or SFA-5.4 E310-15 or 16 filler metal, eliminating conflicts with 3.11.4.5(d)(5).
Part 3, 3.11.6.1(b)	13-227	Revised to permit using bolting material at an MDMT colder than permitted by Tables 3.4 and 3.5, when they have been impact tested in accordance with 3.11.2.1(b) or 3.11.4.1(b) as appropriate.
Part 3, 3.11.8.1(b)	21-1833	Corrected reference "3.10.3.3" to "3.10.3.2".
Part 3, 3.11.8.1(b)	19-1852	Deleted "including cooling rate", so observing the maximum prescribed cooling rates is now the upper limit for the test requirements.
Part 3, 3.11.8.2	21-544	This revision simplifies rules for qualifying WPSs when toughness testing is required. It eliminates the need to take subsized specimens representing each welding process when a multi-process test coupon is used. The new words explain how the results of impact testing are highly dependent on notch location relative to bead overlap in the weld metal and the amount of weld metal and base metal is included in the HAZ test specimen. <i>This is a significant revision.</i>
Part 3, 3.11.8.3(f)(2)	19-539	Removed the requirement that materials used in production be in "the same heat treated condition for PQR plate" for P. No. 1 and Gr. 1&2 materials when qualifying a WPS with impact testing. <i>This is a significant revision.</i>
Part 3, Annex 3-A Table 3-A.1	15-990	Removed SA-283 grade B due to the deletion of this grade from the specification.
Part 3, Annex 3-A, Table 3-A.5	21-71	Adds UNS C70620 and UNS C71520 to Table 3-A.5
Part 3, Annex 3-D, Table 3-D.2	21-2552	Revised "2-1/4 Cr-1/2 Mo" to read "2-1/4 Cr-1 Mo".
Part 3, Annex 3-D, Table 3-D.1	21-2076	Added note (1) clarifying the applicability of the term "Ferritic Steel". Changed "Precipitation Hardenable Nickel Based" "Precipitation hardening, nickel based austenitic alloys".
Part 3, Annex 3-F	22-324	Revised Fatigue Curves to include Austenitic-Ferritic Duplex Stainless Steels
Part 4, 4.1.8.2	21-2126	Removed "Dependent Pressure Chamber" from Mean Metal Temperature Design



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Part 4, 4.2.5.7, 4.2.5.8, Table 4.2.1; Part 7, Table 7.2	08-1205	Added Category F (tube to tubesheet weld) descriptions in 4.2.5.7 and renumbered following section. Removed description for Tube-to-Tubesheet Welds in 4.2.5.8. Revised Table 4.2.1 to define Category F welds. Revised Figure 4.2.1 to show typical location of Category F welds. Revised Table 7.2 to address Category F. <i>This is a significant revision</i>
Part 4, Table 4.2.1	20-1265	Revised “Van stone laps” to “lap joint stub ends” clarifying for code users what was intended by “Van stone lap”.
Part 4, Table 4.2.3	20-1723	Revised Material Type 1, third bullet clarifying that only SA-387 Grade 12 and SA/EN 10028-2 Grade 13CrMo4-5 are included as P-No. 4, Group 1 materials.
Part 4, Table 4.2.9	16-1269	Detail 9, weld size “c” revised to “maximum of $0.25t_n$ or 6mm (0.25 in.)”.
Part 4, Table 4.2.12, Table 4.5.1	21-1649	Corrected “DIN” to “DN”.
Part 4, 4.3.6.1	19-2133	Deleted the lower limit of 20 for L/t in Step 2, for Torispherical Dished Bolted Covers designed in accordance with Part 4.7. This lower limit was determined to be unnecessarily restrictive. <i>This is a significant revision</i>
Part 4, Table 4.11.1	20-2489	Deleted the closure member required thickness calculation from Detail 6 for consistency with Division 1, Appendix 9.
Part 4, Table 4.11.1	20-265	Revised details 6(a) and 6(b) providing rules on sizing welds without an internal fillet weld for consistency with the Division 1 jacketed vessel weld details. Revised detail 6(c) by removing the reference to paragraph 4.2, which refers to Table 4.2.6.
Part 4, 4.15.3	21-1364	Added a reference to Figure 4.15.2 in 4.15.3.5 (c). Added a reference to Figure 4.15.3 in 4.15.3.5 (d). Added a reference to Figure 4.15.4 in 4.15.3.5 (e). Revised the dimension lines for the spacing of two stiffening rings in Figure 4.15.3 (c). Revised “ X_1 ” to “ X_2 ” and dimension line for “a” in Figure 4.15.4 sketch (a). Revisions made to improve clarity.
Part 4, 4.15.6	19-2980	Corrected reference to “Annex 3-A” to “Annex 3-D” in the definition for the term S_{hy} in the Nomenclature.
Part 4, Table 4.16.4, Table 4.16.7	21-1088	Revised the equations for X_h in two places in Table 4.16.4, and revised the equations for h_p in Table 4.16.7 to clarify the difference between calculations for integral and loose type flanges.
Part 4, 4.16.13	21-2000	Revised definition of A_b to reference PCC-1, Appendix H.



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Part 4, 4.18	22-370	Realigned paragraphs and calculation steps for consistency between the heat exchanger types. Revised the shell and channel coefficients to be based on the mean diameter instead of the inside diameter consistent with PTB-7. Editorial revisions improve consistency in the equations and calculation procedure descriptions. Revised nomenclature for consistency with these changes.
Part 4, 4.18	22-369	Added rules for conical channel sections integral with tubesheets. Added new channel coefficients for cones to the calculation procedures and nomenclature. Revised existing channel coefficients and channel stress calculations for integral conical channels. Revised existing figures and added new figures.
Part 4, 4.18.8.4, 4.18.9.4, 4.18.10, 4.18.15 (c), Fig.4.18.13, Annex 4-C	10-95	Relocated paragraph 4.18.10, Figure 4.18.13 and Annex 4-C to new paragraph 4.21. Revised several references to these relocated requirements in paragraph 4.18 to point to their new location. This action makes no technical changes.
Part 4, 4.20.2(d), Figure 4.20.1	20-758	Modified 4.20.2(d) and Figure 4.20.1 to clarify the meaning L_{limit} expressed as $0.5 \cdot \sqrt{R_{tf}}$.
Part 4, 4.20.2(d), Figure 4.20.1	22-372	Revised paragraph 4-20.2(d) to allow straight flanges longer than L_{limit} that do not meet 4.3.3, provided the general primary membrane stress P_m in the straight flange is limited to S for mechanical loads only when supporting the design of the flexible shell element by numerical analysis. This offers an alternative to the design by rule requirements when performing design by analysis. <i>This is a significant revision</i>
Part 5, Table 5.2, Note 1	21-2548	Corrected reference for the User Design Specification (UDS) from 2.2.2.1 (e) & (f) to 2.2.3.1 (e) & (f).
Part 5, Table 5-7	21-2076	Added note (4) clarifying the applicability of the term "Ferritic Steel". Changed "Precipitation Hardenable Nickel Based" "Precipitation hardening, nickel based austenitic alloys".
Part 5, 5.4, Table 5.8	18-1296	Complete rewrite of paragraph 5.4, Protection Against Failure From Buckling making the design margin against buckling of 2.0 consistent with Part 4. Adds new Table 5.8 listing Load Cases. <i>This is a significant revision</i>
Part 5, 5.5.2.4, Table 5.10	17-2651	Fatigue analysis screening under Method B was nonconservative. Revised para. 5.5.2.4, and replaced Table 5.10. Updated C1 & C2 to include the FSRF from Table 5.11 & 5.12. Rewrote each step in terms of the fatigue damage or usage factor. Provided guidance for summing the damage for each step. Removed the need to run an analysis. <i>This is a significant revision</i>
Part 5, 5.4.1.2(a)	21-1443	Corrected B_{crit} to read β_{crit} .



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Part 5, 5.13	21-2547	Corrected reference for User's Design Specification (UDS) from 2.2.2.1 (e) & (f) to 2.2.3.1 (e) & (f) in the definition of load factor.
Part 6, Various	17-1358	6.1.3.1(d)(2): Add a period at the end of the sentence. 6.4.2.2(e): Remove periods as noted to be consistent with other text. 6.4.6.2: Change 500°C to 540°C and 610°C to 595°C to correct SI unit temperature conversion. 6.7.7.2: Change the hyphenated word "post-heat" to "postheat".
Part 6, 6.2.2.2	22-1615	Revised UW-28(d) to permit simultaneous qualification of a welding procedure specification by multiple organizations under the rules of QG-106.4 of Section IX. <i>This is a significant revision</i>
Part 6, 6.4.2, Tables 6.8, 6.9, 6.10, 6.11, 6.12, 6.13, 6.14, 6.15	21-2308	Replaced "min./in." with "for each additional inch" eliminating redundancies in the tables for holding time calculations on thicker members to improve clarity.
Part 6, Table 6.8, Table 6.9	17-875	Removed the " $t_n > 125$ mm." PWHT variables and removed " ≤ 125 mm" from the " $50 \text{ mm} < t_n \leq 125 \text{ mm}$ " section to simplify table headings. Performed equivalent revisions to US Customary Units.
Part 6, Table 6.9, Table 6.10, Table 6.11	20-2715	Revised PWHT Requirements column paragraph (c)(2) in Table 6.9, paragraph (b)(1) in Table 6.10, and paragraph (a)(1) in Table 6.11 to extend PWHT exemptions to wrought and forged butt weld fittings in addition to pipe and tube. <i>This is a significant revision</i>
Part 6, Table 6.10, Table 6.11	21-984	Revised PWHT Requirements column paragraph (b)(2), (3), (4) in Table 6.10 and paragraph (a)(2), (3), (4) in Table 6.11 to extend PWHT exemptions to wrought and forged butt weld fittings in addition to pipe and tube. <i>This is a significant revision</i>
Part 6, Table 6.13	20-1600	Corrected reference from 6.2.6 (Summary of Joints Permitted and Their Examination) to 6.4.2 (Requirements for Postweld Heat Treatment).
Part 6, Table 6.16	21-87	Changed "30(50)" to read "Less than or equal to 30(50)" in the body of the table. Added (a) designation to the existing General Note, and added new General Note (b) to address interpolation of intermediate values. Revised the second sentence in Note 1 to improve clarity.
Part 7, Table 7-3	21-1386, 20-1259	Revised "13 mm (1/2 inch)" to read "6 mm (1/4 inch)" in the heading under "Shell Thickness, t ".
Part 7, 7.4.2	20-1961	Removed reference to the joint efficiency factor, since it is not relevant to the assignment of examination groups.
Part 7, 7.4.9.2	21-2302	Deleted "in accordance with Table 4.2.10" from the second sentence since these joints are not readily radiographed.
Part 8, 8.1.4	20-748	Revised to prohibit installing valves in the connecting line for the pressure gage used in the pressure test.
Part 8, 8.2.4(a)	18-278	Replaced with a new section to improve clarity for determining the minimum pressure test temperature.



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Part 8, 8.2.4, 8.2.5	18-2112	Replaced “examination” with “inspection”.
Part 9, 9.1(c)	14-2498	Deleted phrase "unless the vessel is otherwise protected against overpressure" to eliminate potential confusion.
Code Case 3063	22-657	Adopted Code Case 3063 allowing Pure Isotropic Molybdenum as an acceptable material for construction.



Synopsis of Significant Revisions

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ASME Section VIII, Division 3; *Alternative Rules for High Pressure Vessels*

Note: This Synopsis does not address numerous editorial revisions of a minor nature made by the publisher that do not affect technical requirements.

Paragraph	ASME Record No.	Description of Changes
KG-105	20-2894	Deleted, effectively removing acceptability of constructing and certifying direct-fired vessels and components under this Division. This is unlikely to have a major effect since most direct-fired vessels are constructed and certified under Division 1.
KG-120(a), KG-120(b)		Editorially revised
Table KG-141	20-1466, 22-2203, 22-1838, 22-394	Updated acceptable edition of API 579-1/ASME FFS-1 to 2021. Updated year of acceptable edition for ASCE-7 to 2022. Updated year of acceptable edition for ASME B16.5 to 2020. Updated year of acceptable edition for ASTM E1681 to (R2021) Updated year of acceptable edition for ASTM E1820 to 2021 Updated year of acceptable edition for ASTM E1823 to 2021 Deleted ASTM E338 and ASTM E603, Added ASTM B557, Latest Edition Added Note 2, prohibiting the use of flanges or flanged fittings that rely on a B16 code case.
KG-310, KG-310.1, KG-311.1(a), KG-311.2(d), KG-311.8(c), KG-311.9, KG-311.11 KG-311.13(d) KG-323(c) KG-323(h)	21-860, 22-1897	KG-310: Added requirements for reporting details of the installation location of all vessels when certifying multiple identical vessels under the same User Design Specification (UDS). KG-310.1: Added detailed requirements for the certification of multiple identical vessels under the same UDS. KG-311.1(a): Revised to require a unique serial number be assigned to each vessel when more than one vessel is certified KG-311.2(d): Revised to allow the Manufacturer to defer responsibility for designing vessel supports when support details are not in the UDS. KG-311.8(c): Deleted. Users no longer required to report the source of loading data. KG-311.9: Revised to allow the statement of years, cycles, or both; and allows for determination analytically during the design. KG-311.11: Added a new paragraph addressing how responsibilities and documentation differ when certifying vessels “built for stock”. Revised “Part KR” to read “Part KOP” and changed references to “KR-100” to read “KOP-102”, reflecting a reorganization of rules for overpressure protection devices in this Division. KG-311.13(d): Added a new subparagraph to address jurisdictional and design requirements for individual vessels when certifying multiple duplicate vessels under the same UDS.



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		KG-323(c): Added a new paragraph addressing completion of the Manufacturer's Design Report (MDR) when certifying multiple duplicate vessels under the same UDS. KG-323(h): Added a new subparagraph addresses documenting vessel support design considerations when not specified in the UDS or included in the Manufacturer's design/construction/certification. <i>These are significant new requirements.</i>
KM-101	17-2259	Revised to align with the requirements of KM-100(b) for exemption from the size thickness limits under qualifying conditions.
KM-212.2	19-2306	Revised the definition of "t" in the nomenclature to read "twice the greatest possible distance between and interior locations and the nearest heat-treated surface (KM-211.2)", clarifying the intended quantity of this variable.
KM-230	20-1466	Replaced "tension" with "tensile".
KM-234.1(b)	20-3000	Added new subparagraph (b), adding a required reduction of the required impact test temperature given in subparagraph (a) by 108°F (60°C) for impulsively loaded vessels unless otherwise justified by the designer and described in the Users Design Specification (UDS). Redesignated previous subparagraph (b) as subparagraph (c). <i>This is a significant revision.</i>
KM-234.1(c)	21-775	In newly redesignated subparagraph (c) [previously subparagraph (b) as described above], revised metrication of -325°F to -198°C, and revised "-50°F (45°C)" to "-55°F (48°C)".
Table KM-234.2	20-1466	Added references to "aluminum alloys listed in Table KM-400-4 or Table KM-400-4M" to the General Note.
KM-213, KM-234.4, KM-250	21-2423	KM-213: Deleted introductory sentence. KM-234.4: Added, stating that additional toughness testing per KM-250 is not required if the toughness testing performed here is in the worst-case direction relative to the direction of maximum elongation during rolling or to the direction of major working during forging. KM-250: Changed title of from "Supplementary" to "Additional" and clarified the designer should specify the require number, location and orientation of additional tests. Added final two paragraphs, stating that all tests performed shall meet the impact toughness in KM-234, and that additional toughness testing is not required when using more conservative toughness values from locations and orientations in KM-211/KM-234 in the design.
KM-251	20-2694	Added words stating "The Charpy V-notch impact values specified in KM-234.2 are established at upper shelf energy levels that are required for most high-strength, low-alloy steels. The designer does not need to provide any test information to use upper shelf correlations for these materials." This clarifies the basis for impact testing acceptance criteria referenced in KM-234.2.



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KM-253 & KM-261	21-1831	Corrected all references of “J-Integral” to read “J-integral” for consistency.
KM-270	20-1466	Rewritten to incorporate desired text elements and figures from ASTM E 338 and E 602 after their deletion without replacement.
Table KM-400-1, Table KM-400-1M, Table KM-400.2, Table KM-400.2M	16-443	Deleted Note (17)(a) from Table KM-400.1 and Table KM-400.1M as being unnecessarily redundant, and redesignated existing sub-notes (b) and (c) as (c) and (d) respectively. Similar actions were applied to Note (9)(a) in Table KM-400.2 and Table KM-400.2M.
Table KM-400-1 Table KM-400-1M	21-1712	Devised Note (5) from the stress line for SA-372, Grade 1, UNS G41370, Class 110, limiting it to use only in the liquid quenched and tempered condition.
Table KM-400-1 Table KM-400-1M	21-1871	Added references to Note (16) in the stress lines for SA-321, SA-232, and SA-372. Revised Note (16) replacing “yield” with “material”, clarifying the mechanical property requirements.
Table KM-400-1, Table KM-400.1M	21-2132	Added ASME SA-574, Grades 4137 and 4340 fastener material.
KM-620	20-2740	Added a new formula designated as (KM-620.2) for elastic-plastic stress-strain curve modeling, and redesignated the remaining formulas accordingly. This adds a conditional modification for formula (KM-620.1) clarifying the intent of these rules.
KM-630	21-2552	Revised “2-1/4 Cr-1/2 Mo” to “2-1/4 Cr-1 Mo”.
Table KM-630.1, Table KM-630.1M	21-176	In the General Note, revised “ ΔS_{range} ” to “ $\Delta S_{ess,k}$ ” and also revised “L 320” to “KD-372” to better correlate with KD-372 and formula (KD-372.1). Deleted “ ΔS_{range} ” from the nomenclature since it is not referenced anywhere. Revised the definition of “ $\Delta S_{ess,k}$ ” by adding references to KD-341 and KD-372 in the primary definition and deleting the previously existing secondary definition.
KD-110(i)	22-753	Deleted “or strip” since strip winding is essentially an obsolete fabrication method. This paragraph is now Special Requirements for Vessels in Hydrogen Service and no longer addresses interlocking strip-winding construction.
KD-200(e)	21-1792	Added a reference to Nonmandatory Appendix G, providing additional guidance for the design of clamped connections.
KD-231.2	17-216	Added words to address component assemblies, clarifying that the individual components of such assemblies shall be evaluated using a consistent elastic-plastic material model.
KD-313	17-1971	Added wording to address using the “Critical Plane Approach” to determine the plane of analysis for calculating fatigue stresses when the principal stress axes change and the maximum shear stress plane is not readily identifiable. <i>This is a significant revision</i>



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KD-322(g)(1)	19-1557	In the text following formula KD-322.3, inserted the quantity “($P_L + P_b + Q$)” to clarify the phrase “primary-plus-secondary” stress
KD-322, Table KD-320.1, Table KD-320.1M	14-87	Added words to allow straight-line interpolation of values for points falling in between the tabular values for individual fatigue curves.
KD-430	20-2117	Revised the maximum limit for ΔK_{th} from “1.0 ksi-in. ^{1/2} (1.1 MPa-m. ^{1/2})” to “1.8 ksi-in. ^{1/2} (2.0 MPa-m. ^{1/2})”
KD-620, KD-621, KD-623, Mandatory Appendix 9, 9-400	22-333	KD-620: Added subparagraph (e) describing length of engagement requirements. KD-621: Deleted reference to KD-623. KD-623: Removed and replaced with reference to Appendix 9. 9-400: Added, providing rules for linear elastic analysis previously addressed in KD-623.
KD-634(c)	21-1792	Added new subparagraph invoking a minimum clamp load condition referenced in G-400(b).
KD-740	21-860	Added a new paragraph describing the Manufacturer’s responsibility for reporting necessary design information for the design of vessel supports in the Manufacturer’s Design Report. This rule applies even when these details are not included in the User’s Design Specification, when the Manufacturer does not perform the vessel support design. <i>This is a significant revision</i>
KD-1024	21-1010	Added new paragraph with qualifying conditions for using material test data obtained to meet KD-1022 or KD-1023 for vessels produced from materials other than those tested under KD-1022 or KD-1023.
KF-131 Figure KF-131	21-1462	Relocated the reference to Figure KF-131 in paragraph KF-131 to the end of the last sentence. Deleted “required minimum” from the second sentence. Revised the title of Figure KF-131 for clarity, and revised “<” in the General Note to “≤”.
KF-400, KF-402	22-1100	KF-400: Removed “additional” from reference to Q&T steel heat treatment. KF-402: Revised reference to Section II, Part D to reference KM-400-1 through KM-400-3.
KS-100(a)(7)	18-1873	Revised to include PHT in the list of stamped information for use when a Partial Heat Treatment is applied.



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Part KR; KOP-100; Mandatory Appendix 2, 2-124, 2-125; Nonmandatory Appendix A, Table A-100.1, Table A-100.4; Nonmandatory Appendix M	22-1897	Deleted Part KR; Added Note preceding KOP-100; Deleted 2-124, Inspection of Pressure Relief Valves and renumbered current 2-125 to 2-124; Changed "KR reference to "KOP" in Table A-100.1, Line 34; Changed "KR reference to "KOP" in Table A-100.4, Line 35; Deleted Nonmandatory Appendix M These revisions further implement relocation of the technical rules for overpressure protection devices to Section XIII.
Form CRPV-2A	20-1464	Corrected reference to "ASTM D 2290" to read "ASTM D2290" for consistency with Table KG-141.
Mandatory Appendix 1, 1-100	20-2693	Revised the primary definition for "α" to "crack depth or flaw depth (KD-411, KD-1002, Nonmandatory Appendix D)". Revised the secondary definition to "the depth of a flaw at a weld toe [KD-342(b)]".
Mandatory Appendix 9, Figure 9-200	14-1936	Added a reference to the examples of stress classification found in Section VIII, Division 2, Table 5.6 in a General Note in Figure 9-200.1
Nonmandatory Appendix G, G-100(a)	21-1792	Revised the wording of this subparagraph and added a new second sentence stating: "Unless the requirements in this Appendix are used to meet specific requirements of this Division, they may be used to supplement the applicable requirements of Article KD-2." Revised the formula for A_5 in the nomenclature to read " $p(C_n + C_t)C_t - A_5b$ ", and revised the reference to the Section illustration from "C-C" to "A-A".



Synopsis of Significant Revisions

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ASME Section IX, *Qualification of Welding, Brazing, and Fusing Procedures and Performance*

Note: This Synopsis does not address numerous editorial revisions of a minor nature made by the publisher that do not affect technical requirements.

Paragraph	ASME Record No.	Description of Changes
Various	20-441	Revised QG-101, QW-101, QW-200, QB-200 and QF-200 to allow outside organizations to prepare WPS/BPS/FPS and supporting PQR documents. Final certification by the qualifying organization is still required. This is a significant revision.
QG-106.4	21-2217	Changed “welding” to “material joining” since this is a general requirements paragraph and not a welding paragraph.
QG-108	22-94	Removed the 1962 provisional acceptance date and clarified the status of old PQRs when writing a new WPS supported by them. No technical change intended.
QG-109.2	22-150	Revised the definition of “organization” by removing “some” and the phrase “single or combined” for improved clarity.
QG-109.2, QF-102.2(b)(1)	21-2310	Revised reference to “TN-34” to “MAB-02” in the definition of Manufacturer's Qualified Electrofusion Procedure Specification (MEFPS) in QG-109.2 and QF-201.2(b)(1).
QG-109.2, Article VI	22-123	QG-109.2: Established definitions for the GMAAM process of additive manufacturing. Article VI: Added new Article with rules for qualifying additive manufacturing (AM) of parts using a wire-additive welding (GMAAM) process. This is a VERY significant revision
QG-109.2, Form QF-482(c)	21-55	QG-109.2: Added the definition of “initial heating interfacial pressure” and corrected previous omissions of “sidewall-fusing” Form QF-482(c): Revised to replace “Heating soak interfacial pressure” with “Heat soak gauge pressure”.
Part QW, Various	21-347	Incorporated Manual and Semi-Automatic LBW Welder Qualification Requirements This is a significant revision.
QW-162.1	22-1716	Clarified the acceptability of bending a test specimen removed from a test coupon joining materials requiring different maximum bend radii using a mandrel with the larger of the two specified radii.
QW-181.1, Figure QW-462.4(a)	22-196	QW-181.1: Added a sentence requiring welding of both sides of the procedure qualification plate for fillet welds. Figure QW-462.4(a): Added shading to the edge of the fillet weld on the hidden side of the figure for improved clarity.
QW-191.1.2	21-2531	Revised radiographic acceptance criteria for improved clarity. Revised minor details for consistency with the radiographic acceptance criteria of most referencing construction codes.



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QW-195.3, QW-214.2(a), QW-216.2(a), QW-382.1(c)	19-1681, 22-926	QW-195.3: Added a new subparagraph for liquid penetrant (PT) Personnel Qualification, similar to the rules in Section I and VIII-1. QW-214.2(a): Revised "acceptance standards as" to "requirements". QW-216.2(a) & QW-382.1(c): Added a reference to QW-195.3. <i>This is a significant revision.</i>
QW-202.4(b)(1)	22-1116	Deleted "in joints of similar P-No. materials" to clarify that this rule applies only to the <i>listed</i> material P-Numbers.
QW-217	20-733	Revised to address procedure qualification requirements for single-sided welding of clad plates where the cladding is on the root surface and does not contribute strength in thickness calculations.
QW-218.2	20-2678	Deleted the rule that uphill progression qualifies all positions when attaching applied linings, replacing it with a rule that allows any position to qualify all positions when attaching applied linings. This is reasonable since most applied linings are relatively thin sections.
QW-251.4 QW-410.38	21-349	Replaced "hard surfacing" with "hard facing" for consistency with the rest of the code.
Table QW-253, Table QW-255, Table QW-256, Table QW-257, Table QW-259	21-1567	Restored QW-409.4 and QW-410.9 as nonessential variables for SMAW, GMAW/FCAW, GTAW, PAW, and EGW with some editorial revisions restoring their previous requirement. Added new supplementary essential variables QW-409.30 and QW-410.87 addressing current type and passes per side. <i>This is a significant revision</i>
Table QW-255, QW-409.30	21-2273	Table QW-255: Deleted essential variable QW-409.2 (change in transfer mode) and added new nonessential variable, QW-409.30. QW-409.30: Added new nonessential variable: "At least one of the following transfer modes shall be specified: (a) short-circuiting arc, (b) globular, (c) spray, (d) pulsed-spray". The transfer mode is not essential to mechanical properties.
Table QW-258, Table QW-260	20-2022	Table QW-258 for Electroslag welding (ESW) and Table QW-260 (Electron Beam Welding (EBW) revised by deleting essential variable QW-410.7 (oscillation technique) for procedure qualification, and adds new essential variable QW-410.86 for procedure qualification.
Table QW-264, QW-403.1, QW-403.35	19-2150	Table QW-264: Deleted essential variable QW-403.1 (change in base metal) and added new essential variable QW-403.35 describing the applicable requirements for base metal changes in substantially more detail, for Laser Beam Welding (LBW). <i>This is a significant revision</i>
QW-300.1, QW-304, QW-305, QB-300.1, QF-300	21-960	QW-300.1: Consolidated and moved information from the second paragraphs of QW-304 and QW-305 by adding a sentence stating: "Welders and welding operators may follow any WPS specifying that process within the limits of the essential variables for which they are qualified." No technical changes, simply improving clarity of intent. QB-300.1 & QF-300: Applied similar revisions.



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QW-306 Figure QW-462.4(a)	21-1017	QW-306: Added a prohibition from using a single fillet welded test coupon for qualifying multiple welding processes and multiple welders or welding operators. Figure QW-462.4(a): Removed the General Note to eliminate any potential conflicts with QW-183(a).
QW-322	20-2989	Revised to clarify that welding operators using machine welding can maintain qualifications for both machine and automatic welding, and a welding operator using automatic welding only maintains their qualifications for automatic welding.
QW-361.1(e)	21-1015	Revised to exclude Friction Stir Welding (FSW) from applicability under this variable, intended only to apply to other types of friction welding processes. Previously implied applicability was unintended.
QW-381.1 QW-382.1(d)	21-636	Revised to clarify there are no qualified base metal thickness limits for welders and welding operators when applying corrosion resistant and hard facing weld metal overlay, except as stated in the WPS.
QW-382.1(g)	21-637	Revised to clarify there are no limits on welding operators using qualified AWS classifications of filler metals when applying hard facing weld metal overlay, except as stated in the WPS.
QW-382.1(h)	21-651	Deleted the requirement for additional qualifications of a welding operator when there is a change in the welding process. These rules already appear in QW-361.1 and QW-361.2.
QW-401.1	21-1611	Deleted the last sentence in the third paragraph, which implied that only heat affected zone (HAZ) impact tests were required to support additional qualifications of a WPS for toughness when the WPS was not previously qualified for toughness. This clarifies that the construction code specifies the requirements for toughness testing, not Section IX. <i>This is a significant revision</i>
QW-403.10	21-2336	Deleted QW-403.10, which previously imposed thickness qualification limits for welding procedures when welding the test coupon using GMAW in the short-circuiting transfer mode. These limitations no longer exist for procedure qualification. This variable is no longer referenced or necessary.
QW-404.12	21-635	Revised and reformatted to improve clarify of intent.
QW-408.2	21-2534	Revised this variable for shielding gas addition, omission, or changes in gas composition. Introduced the concept of Oxygen Equivalent as a basis for these revisions when taken in combination with some electrode specifications. <i>This is a significant revision</i>
QW-409.26	20-2513	Revised to address methods for determining heat input when applying corrosion resistant or hard facing overlay welding, taking into consideration oscillation width and measuring the heat input in J/mm ² instead of J/mm. <i>This is a significant revision</i>

QW-421.1(b)	22-188	QW-421.1 (b): Replaced existing text with the words of QW-421.1(c).
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QW-421.1(c) Table QW/QB-422		QW-421.1(c): Deleted after shifting words to QW-421.1(b) Table QW/QB-422: Revised all ASTM/ASME material specification prefixes in Spec. No. column from “A/SA” to “A or SA” and from “B/SB” to “B or SB”. These changes clarify material identification.
QW-424.3, Table QW/QB-422	21-945, 22-320	QW-424.3: Added a new subparagraph providing an explanatory note for assigning P-Nos. to weld metals. Table QW/QB-422: Assigned P-Nos. to weld metals from SFA-5.9, SFA-5.18 and SFA-5.28 based on their SFA classifications. <i>This is a significant revision</i>
Table QW/QB-422, QW-421.1, Appendix J, J-100.	22-1476	QW-421.1: Added a sentence advising code users that P-number assignments listed in https://source-link but not identical to those printed in Table QW/QB-422 may be used. Table QW/QB-422: Revised the title. Added a subtitle informing code users of a searchable source link containing data used to generate the table. The source link updates in real time, and may contain material with assigned P-numbers not yet published table. Appendix J, J-100: Revised to add a reference to the source link mentioned in QW-421.1 and the subtitle of Table QW/QB-422. The searchable source data provides the ability to authoritatively search for base metals of interest in any desired order or grouping. <i>This is a VERY significant revision</i>
Table QW/QB-422	21-33, 21-56, 21-179, 21-1725, 21-2131, 22-25, 22-26, 22-323, 22-1031, 22-1049,	A/SA-182: Deleted “in.” from ‘Nominal Thickness Limits’ column. On thicker material changed “> 5 in. (125)” to “> 5 (125)”. On thinner material, changed “---” to “< 5 (125)” adding a nominal thickness range A/SA-240: Added a nominal thickness range to both the thicker & thinner materials. For plate, changed “---” to “> 0.187 (5)”. For sheet & strip, changed “---” to “< 0.187 (5)” A/SA-240 UNS S20153 plate: Revised brazing P-No. to 102. A/SA-240 UNS S32101: Revised Minimum Specified Tensile Strength A/SA-691, Grade 91: Replaced UNS K91560 with K90901. Add A/SA-213 and A/SA-312 UNS S31002 as P-No.8, Group 2 Add A/SA-213 UNS 31043 as P-No.8, Group 3 Add A/SA-312 and A/SA-358 UNS S20153 pipe as P-No.8, Group 3. Add A/SA-789 and A/SA-790 UNS S32707 as P-No. 10H, Group 1 Add B/SB-626 UNS N06617 welded tube as P-No. 43 material. Add IRAM-IAS U 500-42 Grade plate/sheet/strip as P-No.1, Group 1. Add EN 10216-3/EN 10028-6, Grade P690QL2 as P-No. 11B, Group 4. Revised Minimum Specified Tensile Strength Ksi values for AS 1448, SA/EN 10028-3, SA/GB 713, IRAM/IAS U 500-42, SA/JIS G3118, and SA/JIS G4303 Revised Typical Product Form for A/SA-240, SA/EN 10028-2, IRAM/IAS U 500-42, B/SB-169, B/SB-171, B/SB-209, B/SB-283, B/SB-333, B/SB-582, B/SB-688 and B/SB-928:



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Table QW/QB-422, QW-421.3(a), QW-421.4	22-2233	Table QW/QB-422: Revised column title from "AWS B2.2 BM-No." to "P-No." under "Brazing" header and deleted number column previously appearing under the former heading of "P-No.". QW-421.3(a): revised to adopt AWS BM-Nos. as brazing P-Nos. QW-421.4: Revised to apply to brazing as well as welding.
Table QW-452.4	22-2256	Revised Note (a) to include applicability of the qualified fillet weld sizes from Table QW-452.5.
Figure QW-462.1(a), Figure QW-462.1(b), Figure QB-462.1(a), Figure QB-462.1(b), Figure QB-462.1(c)	20-1101	Replaced "This section machined preferably by milling" with "This section prepared preferably by machining". The intention is to avoid creating the reduced section by thermal cutting, potentially affecting the tension test results. The previous word "milling" unintentionally implied specimen processing was required to use only that method. .
Figure QW-462.4(a)	20-1847, 20-2921	Deleted the existing General Note regarding the acceptance criteria for the fillet weld macro etch test, already given in QW-183. Added a new General Note to permit substitution of a tube or pipe for the horizontal plate, which is now an acceptable option.
Figure QW-462.5(b)	20-2658	Note (2) revised to allow removal of test specimens for qualification of overlay procedures from a single 180-degree vertically welded segment of the pipe. Deleted the words requiring requalification when changing from downhill progression to uphill progression, but not vice versa. This unnecessarily repeats an existing rule.
Figure QW-463.2(a)	20-2657	Replaced graphic depictions of weld joint cross sections for improved aesthetics. No technical changes.
Figure QW-466.1, QW-466.3, QW-162.1	20-2682	Figure QW-466.1: Corrected the word "bend" to "bent" in Note (c). Figure QW-466.3: Deleted the instruction for executing a wrap-around bend test in Note (d), relocating it to QW-162.1.
Table QW-466.1	21-2341	Corrected tabular value of "D" from 3/16 in. to 1-3/16 in. in the next to last row. <i>This action corrects a substantial error</i>
Form QW-483	20-1100	Added a field to indicate when the rules of QG-106.4 rules for group procedure qualification are applied. <i>This is a significant revision</i>
Form QW-484A	21-2338	Revised to include new qualification variables for welders performing manual and semiautomatic Laser Beam Welding (LBW). <i>This is a significant revision</i>
Article VI, QW-600	22-2047	Revised the title of Article VI from "WIRE-ADDITIVE WELDING" to "Material Manufacturing using Wire-Additive Welding". See 22-123.
Various Part QB Tables	21-1215	In Tables QB-252, 253, 254, 255, 256, 257, 432, 451.5, 452.1, and 452.2, editorially revised the columns and column headings to remove paragraph and Figure references. In Table QB-451.4, corrected the title of the last column from "Tension" to "Section". No technical changes intended by this action.



Synopsis of Significant Revisions

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QB-161.2, QB-211, QB-212, QB-322, QB-351.2	21-321	QB-161.2: Revised "first" surface to a "second" surface bend. QB-211: Revised to clarify pipe test coupons also qualifies procedures for plate brazing, but not vice versa. QB-212: Revised to clarify use of workmanship coupons for procedure qualification. QB-322: Revised title to "EXPIRATION, REVOCATION, AND RENEWAL OF QUALIFICATION". Editorially revised introductory sentence. QB-322(a): Editorial cleanup and gender neutralization. QB-322(b): Relocated the majority of subparagraph QB-322(b) into a new subparagraph QB-322.1, and revised wording for clarity. QB-351.2: Revised title to add "Brazing".
Table QB-451.4	22-1415	Replaced "Tension" with "Section" in column heading of the last column to correct a publishing error by errata.
Table QF-254, Table QF-257, Table QF-409, Form QF-482(c), Form QF-483(c)	20-2585	Revised Tables QF-254 and -257, QF-405.9, and Forms QF-482(c) and QF-483(c) for consistency in the use of the term "initial heating interfacial pressure."
QF-402.3	21-2311	Corrected reference from "Table QF-254" to "Table QF-255".
Nonmandatory Appendix B, B-101	21-1045	Corrected references to Form QW-484A and Form QW-484B with a revised reference to Form QW-482.
Nonmandatory Appendix E	21-2251	Update AWS SWPS B2.1-1-2009 to the 2019 Edition
Nonmandatory Appendix L	21-294	Revised to clarify Nonmandatory Appendix L rules for simultaneous welder qualifications under Section IX and ISO 9606-1 to resolve confusion. Some updated and additional references were included in this action. <i>This is a significant revision.</i>



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ASME Section X, *Fiber-Reinforced Plastic Pressure Vessels*

Note: This Synopsis does not address numerous editorial revisions of a minor nature made by the publisher that do not affect technical requirements.

Paragraph	ASME Record No.	Description of Changes
RS-133	21-2023	Added new paragraph RS-133 that provides rules for the use of duplicate nameplates.
Part RR, Nonmandatory Appendix AM		Deleted Part RR, previously containing overpressure protection requirements that are now located in Section XIII. Deleted Nonmandatory Appendix AM containing a cross reference table identifying the location of previous overpressure protection requirements in Section XIII.
Mandatory Appendix 8, 8-100.6	22-481	Revised to remove service life limitations for Class 3 vessels that are carbon fiber reinforced. The maximum service life of 20 years for Class 3 fiberglass vessels remains intact. There have been no changes to the service life for Class 1 and 2 vessels, which remains unlimited. <i>This is a significant revision</i>
Mandatory Appendix 8, 8-200.4	16-1874	Deleted paragraph 8-200.4 and relocated all referenced codes and standards previously listed there to Table 1.1 with the other standards referenced by this code section. Also added or updated the referenced Edition of the referenced standards as a part of this revision.
Mandatory Appendix 8, 8-700	19-1767	Revised Appendix 8, paragraph 8-700 to provide some relaxation and clarification of the requirements for pressure testing.
Mandatory Appendix 8, 8-700.5.8(b) & (c)	22-482	Revised to include hydrostatic testing as a means of pressure test, and to allow the test pressure to be sufficient for detection of leaks, which may be at the design pressure or a lesser pressure.
Mandatory Appendix 8, Table 8-900, 8-1000		Revised Forms CPV-1 and CPV-2, and Table 8-900.3.1; relocating them to Nonmandatory Appendix AJ.
Nonmandatory Appendix AJ	22-770	Updated and editorially revised all Manufacturer's Data Report forms listed for this code Section. Close attention to detail is encouraged when using the new forms. <i>This is a significant revision</i>



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ASME Section XII, Rules for Construction and Continued Service of Transport Tanks

Note: This Synopsis does not address numerous editorial revisions of a minor nature made by the publisher that do not affect technical requirements.

Paragraph	ASME Record No.	Description of Changes
TG-110.1(a), TG-120.1(d)	19-1386	Revised TG-110.2 (a) from 3,000 to 2000 psig to align with the upper pressure limit in Modal Appendix 4. Added new subparagraph (d) to TG-120.1(d) to exclude "Tube Trailer" Cylinders/Tubes/Multiple Element Gas Containers to clarify their exclusion from this Section.
TD-320, Nonmandatory Appendix N	09-1853	Added a new paragraph addressing rules for quick actuating closures, and a new Nonmandatory Appendix N. These rules follow the direction given in UG-35 and Appendix FF of Section VIII, Division 1. <i>This is a significant revision.</i>
TD-630, TD-630(b)(3), Figure TD-630	20-474	Revised the title of TD-630 to add "and covers". Added new subparagraph TD-630(b)(3) with rules addressing spacing requirements between openings in flat heads. Added Figure TD-630 to illustrate the rules added in TD-630(b)(3).
Table TD-650	22-2333	Removed unnecessary "Sv" term in 3 places in Table TD-650.
Table TM-130.2-1	17-17	Revised Table TM-130.2-1 to remove SA-283 grades A and B
Table TM-130.2-4	21-1809	Revised Table TM-130.2-4 to add alloys C70620 and C71520.
Table TM-130.2-5	20-2453	Revised Table TM-130.2-5 to remove UNS N08024 and N08026 from SB-463.
TR-130(a)	18-2998	Revised TR-130(a) to require the pressure relief device to communicate with the vapor space of the vessel, and removed the minimum capacity of 450 L (120 gal.) for locating openings in the top of the tank, which is no longer applicable.
TS-110(a), TS-200, Form T-2A, Form T-2B, Form T-2C, Nonmandatory Appendix D	21-1018	Revised "PRT" to read "PRT XII" in these locations.
Modal Appendix 1, 1-1.6(a)(1), 1-1.6(a)(3), 1-1.6(a)(5)	20-484	Added ", pressure, or both" to first sentence of 1-1.6(a)(1). Revised "fittings" to "device(s)" in last sentence of 1-1.6(a)(3). Added ", and inboard of the protective device(s)" to 1-1.6(a)(5). Title 49 CFR uses the terms "pressure-retaining" and "lading-retaining" interchangeably. This Section uses both terms in different places, which is appropriate in this context. These revisions improve clarity.
Modal Appendix 1, 1-2.1(b), 1-2.1(c)	20-486	Added SI units to 1-2.1(b). Revised the first sentence of 1-2.1(c) to correct the minimum set pressure to 110% of MAWP or 3.3 psi, whichever is greater. Revised 1-2.1(d) to replace the redundant requirement for a vacuum relief with a reference to 1-1.8(a)(2)(-b) requiring a normal vent consistent with Title 49 CFR rules.



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Mandatory Appendix VIII, VIII-2(b), Figure VIII-2-1(f), Figure VIII-2-3, Figure VIII-2-4	20-2283	Added several definitions to VIII-2(b). Corrected "bulged rectangle radius corner tank" image in Fig. VIII-2-1(f). Added a formula adjusting the geometry of a "bulged rectangle radius corner tank" in Figure VIII-2-1(f). Made editorial corrections to formulas in Figure VIII-2-3. Added notes for "L" in Figure VIII-2-3 and Figure VIII-2-4. Improved graphics for a baffle/shell joint in Figure VIII-2-3 and Figure VIII-2-4.
Mandatory Appendix VIII, VIII-2(c)(2)	22-2194	Corrected " L_{B2} " to read " L_B^2 " in the embedded formula.
Mandatory Appendix VIII, VIII-2(d)(3), Figure VIII-2-3	22-2282	Corrected " P_a " and " P_b " in VIII-2(d)(3) and Figure VIII-2-3 to read " P_a " ($P \times a$) and " P_b " ($P \times b$) instead of the subscripts as previously shown.
Mandatory Appendix XIX	22-1855	Deleted these capacity conversion factors for pressure relief devices now found in Section XIII.
Nonmandatory Appendix E, E-6(k)	20-494	Revised E-6(k) to add commas, making it read "All piping, valves, and fittings"
Nonmandatory Appendix E, E-6(o), E-6(p)	20-493	Revised E-6(o) to increase the minimum melting point of brazing material from 525C (977F) to 538C (1000F). Revised E-6(p) to add new requirement of pipe joints to be threaded, welded, or flanged.
Nonmandatory Appendix M	22-1855	Deleted Nonmandatory Appendix M. This Section XIII cross-reference Appendix was specific to the 2021 edition and intended to be in place for only one edition.



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ASME Section XIII, Rules for Overpressure Protection

Note: This Synopsis does not address numerous editorial revisions of a minor nature made by the publisher that do not affect technical requirements.

Paragraph	ASME Record No.	Description of Changes
Table 2.1-1, Note 9; 3.9(e)(5)(-b); 4.7.3(g)	22-1447	Corrected Table 2.1-1, Note 9 reference to Section VIII, Division 3 subparagraph KOP-152(c). Corrected 3.9(e)(5)(-b) references to Section VIII, Division 3 subparagraphs to KOP-153(b), KOP 154(b), and KOP-54(c). Corrected 4.7.3 references to Section VIII, Division 3 subparagraph to KOP-152(c).
3.1.2(b); 5.2(j)	20-384	Added the words "at or below the relieving pressure used to determine its rated capacity" after "its full rated capacity" in paragraphs 3.1.2.(b) and 5.2.(j). This revision clarifies the intent of the test requirements.
3.3.2(d)	20-373	Added the words "erosion caused by high velocity steam" after "resistance to" and parenthesis to "steam cutting" such as (i.e.; steam cutting) in paragraph 3.3.2(d) for improved clarity. This effect is also referred to as "wire drawing" in some circles.
3.4.2.3(a); 3.4.2.3(b)	21-1754	Revised current paragraph 3.4.2.3(a) to clarify the requirement to submit replacement valves on a one-for-one basis when blowdown is not adjustable during testing. Swapped the sequencing of current paragraphs 3.4.2.3 (a) and (b) for improved clarity.
3.5(b); 3.5(c); 4.2(d); Mandatory Appendix I	20-2765	The definition of an "Assembler" and "Manufacturer" in Mandatory Appendix I were revised for improved clarity. Administrative and organizational requirements previously found in these definitions were removed and relocated by: 1. adding new subparagraphs 3.5(b) and (c), and redesignating the remaining subparagraphs of Section 3.5; and 2. adding new subparagraph 4.2(d).
3.6.2(b)	22-1446	Revised to correct "UV" designator with "UV3" designator.
Table 3.6.3.1-2	21-1752	Added a set pressure tolerance of -0/+10% to Table 3.6.3.1-2 and revised Note (3) to clarify that these set pressure tolerance apply to devices used in service applications addressed by UG-153(a)(3) in Section VIII, Division 1. Those applications are where overpressure protection of the vessel is required during exposure to fire or other external heat sources.
3.6.4(b)	20-2297	Revised to change "water" to "incompressible fluid", change "gas" to "compressible fluid", and clarified the acceptance criteria for seat tightness testing using compressible fluids. These changes recognize that overpressure protection devices are tested and installed in systems using fluids other than water and air, where different criteria apply.



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10.7(b); Mandatory Appendix III, III-2.11	22-938	10.7(b): Deleted the requirement for retaining a copy of the Certificate of Conformance for a minimum of five years. III-2.11(a): Reformatted paragraph with numbered bullets listing the documents requiring retention for a minimum of three years. III-2.11(b): Relocated the requirement for retaining a copy of the Certificate of Conformance for a minimum of five years to this new subparagraph. These revisions eliminate perceived conflicts between 10-7(b) and III-2.11.
Mandatory Appendix I, I-2; Mandatory Appendix III, III-2-13(d); Nonmandatory Appendix C, Tables C-2-1, C-2-2, C-2-3, C-2-4, & C-2-5	22-1675	Replaced gender specific pronouns with alternative wording as follows: I-2: Replaced “he” with “the material manufacturer” in the definition for “Material Test Report” III-2.13(d): Replaced “his/her” with “the Designee’s” Table C-2-1, Note (17): Replaced “shown on his/her” with “it appears on the”, and in the second sentence replacing “should” with “shall”. Table C-2-2, Note (18): Replaced “shown on his/her” with “it appears on the” Table C-2-3, Note (18): Replaced “shown on his/her” with “it appears on the” Table C-2-4, Note (17): Replaced “shown on his/her” with “it appears on the” Table C-2-5, Note (18): Replaced “shown on his/her” with “it appears on the”